DIMENSIONS OF SUPPLY RISKS IN THE SUPPLY OF WATER: A CASE OF ZULULAND DISTRICT MUNICIPALITY

BY

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A dissertation in partial fulfilment for the Degree of

Master of Commerce

Supply Chain Management

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December 2017

Declaration

I, Sebenzile Ayanda Khuzwayo, declare that:

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Abstract

Increasing water shortage is providing an imperative to the measurement of water utilisation. So as to give a sensible picture of utilisation, this measurement ought to incorporate the operational activities of the municipality as well as to view from an end to end supply chain point of view. This study, subsequently, aimed to investigate the supply risks in the supply of water of the Zululand District Municipality. The study has four objectives; firstly to establish the degree of balance between water supply and demand characterized by driving forces of service delivery; secondly to determine the extent of supply risk management of water within the restraining forces of the Zululand District Municipality; thirdly to determine the magnitude response capacity of the Zululand District Municipality to mitigate the supply risk of water delivery; and lastly to analyse whether the integration of service delivery activities enhance the supply component of water. The case study is exploratory and a thematic analysis approach was adopted after gathering information through an in-depth interview. It became evident in this research that district municipalities lack the capacity to deliver water services due to a variety of supply chain risks faced by the municipality. The study also showed that the region is confronted with various risks with regard to supplying water to the community members of the surrounding area. The implications of water shortage negatively affect the livelihood and enhancement of the people neighbouring the Zululand region.

Key concepts: Water Shortage, Water Supply, Service Delivery, Supply Risk Management, Supply Chain Risk

Acknowledgement

I would like to thank the following people for their input and support in making this research project a success:

- First and foremost, I would like to extend my greatest honest gratefulness to the Lord Almighty, for providing me with the strength, resilience and courage to pursue all the endeavors which I have imagined for my life. Thank you heavenly Father!

- I would like to acknowledge my beloved family, for without their unconditional love and support, I would have never accomplished half of my life long objectives. Thank you for your consistent prayers. Thanks goes to my beloved father Mr Dumisani Khuzwayo; my late mother Gugulethu Dlamini; Thabsile Dlamini; Nomthandazo Mhlongo; Xolani Mhlongo; Gugulethu Nkabinde; Sandile Khuzwayo; Andile Khuzwayo; Anele Khuzwayo; Andile Biyela.

- My sincere gratitude goes to my supervisor, Dr T.P Mbhele, for his valuable patience, encouragement, guidance, expertise and both constructive criticism and positive feedback during the writing process, which contributed massively towards the completion of this study. I thank you and I appreciate the impact that you have made in my life. May God bless you and your family

- My sincere gratitude also goes to Professor T.I Nzimakwe for the encouragement he has given me throughout the year.

- My sincere appreciation for the insightful advice and always being there for me goes to Hlengiwe Mpungose, Saneliswe Gasa and Noxolo Lujiva

- Lastly, I would like to extend my gratitude to the Zululand District Municipality officials with their time in helping me conduct this research study accordingly.

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List of Abbreviations

ZDM	Zululand District Municipality
SCM	Supply Chain Management
SCRM	Supply Chain Risk Management
SCMCP	Supply Chain Management Council of Professionals
WSA	Water Services Act
FBWP	Free Basic Water Policy
RSA	Republic of South Africa
WSSA	Water and Sanitation Services South Africa
WSDP	Water Services Development Plan
WTE	Water Trading Entity

CHAPTER ONE
INTRODUCTION TO THE STUDY

1.1 Introduction

Supply Chain Management (SCM) is genuinely new as an idea inside government and very unpredictable in nature. The stipulations are set up, regarding enactment, direction and rules. Nonetheless, in light of the fact that this thought is similarly new in the South African setting, little data exist to state whether its motivations have, or have not, been commendably accomplished. According` to Bowersox, Closs and Cooper (2010), supply chain management has become an important means for companies today to gain competitive advantages through cooperation with their partners, but supply chain is vulnerable to many risks, especially today's international environment which is characterized by elements such as natural disasters, terrorism, supply disruption and demand variation. "An absence of understanding with respect to the concept of supply chain management and its inseparable connection to long-term quality service delivery, human capital advancement and related socio-economic growth, might be the main drivers of issues ambushing government and the general population at large" (Boateng, 2010).

Services are expanding in significance in international business and understanding the attributes of services in the supply chain context can give critical information to enabling proficient and compelling usage of risk management (Vilko and Rit`ala, 2014). Regardless of the broad consideration received by customary manufacturing supply chains, service supply chain remain less investigated (Sampson and Spring, 2012).

Supply chain risk management (SCRM) has been increasingly attracting attention from academic researchers. However, for the most part, the concepts are still under development and many continue to be without a commonly accepted definition (Vilko, Rumpu and Koivuniemi, 2012). SCRM deals with identifying all sorts of risks that can lead to interruptions in the supply chain (Juttner, Peck and Christopher and 2003: 56). Another supporting definition of SCRM is that it is "the management of supply chain risk through

coordination or collaboration among the supply chain partners, so as to ensure profitability and continuity" (Bios, Quaddus, Wee and Watanabe, 2009: 247).

According to Arlbjorn, Freytag and de Haas (2011:277), it is important to differentiate the tasks in service supply chain management, which can be achieved through different types of relationshipswith customers, as well as suppliers. Therefore, this study aims to investigate the dimensions of supply risks in the supply of water in the Zululand region.

1.2 Background

A municipality is a corporate body that has particular thoughts and obligation areas, a political structure, political office bearers and a municipal manager and has purview in a characterized geological zone as dictated by the local government Municipal Demarcation Act 1998 (Graythorne, 2006: 119). As indicated by Boshoff and Mazibuko (2008:14), municipalities in South Africa are vital part players in service delivery. They are required by law to discover creative techniques to involve communities in every one of their undertakings. As far as the Constitution (Section 108 of 1996) is concerned, the command of the municipality is to guarantee service delivery, for which it is capable of fulfilling citizens' fundamental needs.

A supporting proclamation by Nealer and Raga (2007:171) which affirms the Constitution is an agreement between the South African government and citizens of the country, built up by the organizing of the three spheres of government legislature and the execution of public policies. Service delivery is a typical expression in South Africa, used to portray the dissemination of fundamental assets which citizens rely upon, which in this case, is water (Chen and Dean, 2014). Crous (2002:19) underpins this by further expressing that service delivery is concerned with the arrangement of a product or service, by a legislature or government body to a community that it is guaranteed to or which is normal from that community.

According to the Public Service Commission (2002:11), with regards to service delivery in risk management, it is required from all public service managers to utilise risk management processes on a daily basis to ensure that stated objectives are achieved in terms of periods, quantity and quality (service standards). Risk management within this framework is normally informed by three critical questions:

(a) What is the objective?

(b) What can go wrong or can threaten the accomplishment of the objective.

(c) What can be done within set limitations to manage or minimize the results of the risk?

It is pivotal to establish the supply risk associated with the balance between the supply, as well as the demand of water from a local government and supply chain perspective. Supply chain management risks have a negative impact on both short and long-term operations and financial performance (Shao, 2012). South Africa has experienced service delivery protests from early 1994 till 2010 which doubtlessly exhibit that communities are not content with the pace of service delivery (European Union Municipal Outreach, 2010:18). In view of the above, this study investigated the magnitude of the balance between the supply and the demand of water services in Zululand region. This study mainly focused on the prospects of improving water supply within the framework of force field to establish the degree of supply risks and specifically, of water service delivery.

1.3 Research Problem

Although the local government is in charge of delivering fundamental services to its local communities in quicker, less demanding and more proficient ways, municipal communities are still confronting various challenges with respect to access to basic services such as water. Accomplishments in public services are far behind the fulfillment level of people in general. Throughout the years, the local government has been embroiled in service delivery protests, with citizens protesting for water since they are not getting it in adequate supply. Citizens around the Zululand region are fundamentally grumbling about service delivery of sufficient water supply, while the municipality is attempting to handle the excessive demand with restraining forces affecting the benefit of the supply of water within supply chain operations. Zululand District Municipality presents a case as the contextual exploration to access the extent of supply risks in water delivery and the driving force dimensions to align with SCM. In view of that, the study has the following aims and objective.

1.4 Research objectives and questions

The main aim of this study was to investigate the supply risks faced by the Zululand District Municipality with regards to delivering water to the community. The study also aims to

establish the balance between water supply and water demand. On that note, the study had the following objectives.

Research Objectives

1. To establish the degree of balance between water supply and demand characterized by driving forces of service delivery
2. To determine the extent of supply risk management of water within the restraining forces of the Zululand District Municipality
3. To determine the magnitude response capacity of the Zululand District Municipality to mitigate the supply risk of water delivery
4. To analyse whether the integration of service delivery activities enhance the supply component of water

Research Questions

1. What is the degree of the balance between water supply and demand characterized by driving forces of service delivery?
2. What is the extent of supply risk management of water within the restraining forces of the Zululand District Municipality?
3. What is the magnitude response capacity of Zululand District Municipality to mitigate the supply risk of water delivery?
4. Does the integration of service delivery activities enhance the supply component of water?

1.5 Preliminary Literature Review

To guide the literature which aimed to provide the background of the study, a supply chain risk management framework was utilised. In identifying the risks faced by the supply and demand of water in the service sector, the SCRM framework chosen will be required to fulfill the understanding of this study.

1.5.1 Definition of terms

These are significant terms that will be used throughout the study. The following table provides the definitions of the terms.

Table 1.1: Definition of terms

Terms	Definition
Risk	"Risk refers to the uncertainty that surrounds future events and outcomes. It is the expression of the likelihood and impact of an event with the potential to influence the achievement of an organization's objectives" (Berg, 2009:48).
Risk Management	"Risk Management is the process of identifying, assessing and controlling threats to an organization's capital and earnings. The threats or risks could stem from a wide variety of sources, including financial uncertainty, legal liabilities, strategic management errors, accidents and natural disasters" (Rouse, 2016).
Supply Chain Management	"Supply Chain Management encompasses the arranging and administration of all exercises required in sourcing and acquisition, transformation and logistics management activities. Essentially, it likewise incorporates coordination and cooperation with channel accomplices, which can be providers, mediators, third party service providers, and customers. Basically, SCM coordinates supply and demand management with and across companies" (Council of Supply Chain Management Professionals, 2012).
Supply Chain Risk Management	"SCRM is a formalized, structured and disciplined approach encompassing the entire supply chain, including supply chain partners and related activities, with the purpose of identifying, exploring, analyzing, evaluating, treating, monitoring, reviewing and communicating supply chain risks associated with supply chain activity, function or process in a way that would enable firms to minimize losses and maximize opportunities" (Olson and Wu, 2010).
Service Delivery	"Service delivery is the perception of rendering services to citizens. The poor service delivery by South African municipalities has received much attention in recent years. In South Africa, service quality within local government is perceived as being generally poor" (Moletsane, 2012).

1.5.2 Water Industry

The water industry gives drinking water and wastewater administrations to the private, business, and industrial sectors of the economy. The industry additionally incorporates manufacturers and suppliers of bottled water. Water privatization by organizations in the water industry is turning into an issue, since water security debilitates local communities (Chaisse, 2017). Furthermore, drinking water and wastewater services must be given to various segments of a country's economy, including its industrial segments, business divisions and private areas.

1.5.2.1 Drinking water

Drinking water, also called potable water or enhanced drinking water, is the water that is safe to drink or to use for nourishment arrangement, without risk of health issues (Radhakrishna, 2017). According to Grandjean (2004:2), water is essential to life. The amount of drinking water required is varied, depending on the physical activity, age, health problems and natural conditions of people. It is vital that a normal individual consumes around one litre of water a day. Ordinarily, in developed countries, tap water meets drinking water quality standards, despite the fact that a small portion is really devoured or utilised as part of food preparations.

The Department of Water Affairs and Forestry maintains that South Africa's national standard of water quality contrasts well with the World Health Organization standards. The obligation to provide clean water rests with locally-based water administrations authorities, which routinely monitor the nature of drinking water in South Africa. These authorities are likewise appraised by the department as per the Blue Drop Certification System, which persistently evaluates, in addition to other things, their water safety planning (South African Tourism, 2016).

1.5.2.2 Wastewater

Wastewater is any water that has been unfavourably influenced in terms of its quality by the environmental impact. Wastewater can start from a combination of domestic, industrial, business or farming activities, surface runoff or storm water and from sewer inflow or infiltration (Tilley, 2014). Moreover, the EST (2016) expresses that municipal wastewater (likewise called sewage) is generally passed on in a consolidated sewer or sanitary sewer and treated at a wastewater treatment plant. Treated wastewater is released into receiving water

through an emanating pipe. Wastewaters created in regions without access to centralized sewer systems depend on location wastewater systems. These ordinarily contain a septic tank, drain field and alternatively, an on-site treatment unit. The administration of wastewater has a place with the overall term sanitation, much the same as the management of human excreta, solid waste and storm water, which is drainage (Jason, 2011).

Through the above information about the water industry, it is realized how important water is to the community, as well as for the municipality to understand the supply and demand of water in order to meet the needs of the local communities. It is important to find the supply risks associated with delivering this specific service and then finding ways to mitigate the issues accordingly.

1.5.3 Supply Chain Management in the Public Sector

The public sector, unlike the private sector, focuses on service delivery rather than on maximizing profit. According to Magiro and Ambe (2008:231), actors in the public sector supply chain comprise private firms that receive orders from public sector agents; accounting officers and policy makers. The contribution that the actors make to SCM has an impact on its implementation.

To support the above statement, Amber and Badenhorst (2012) define public procurement as the function whereby public sector organizations acquire goods, services and development and construction projects from suppliers. Goods and services should be acquired in line with the general principles of fairness, equitability, transparency, competitiveness and cost-effectiveness enshrined in the Constitution (Section 217 of 1996). Procurement is seen as central to the government service delivery system, as it comprises crucial activities that support service delivery.

Amber and Badenhorst (2012) further indicate that the public sector procurement amounts to billions of rands down from taxes. As a result, the concepts of transparency and accountability are more significant in public procurement than in any other department, because it is state money that is used to procure goods and services. By integrating SCM in the public service, it plays the critical role of optimal logistical support and improved management of secondary inventory, with the ultimate goal of achieving efficient financial management (Essig and

Dorobek, 2006). Moreover, Larson (2009:228) further supports that in the public sector, SCM is regarded as a narrow concept, essentially in an element of procurement, rather than a concept that encompasses multiple functional areas.

1.5.4 Service Delivery

Service delivery is the difference between the service provider's actual delivery of the service and the perceived quality of a service is the customers' perception that counts, not what the service provider thinks. If a customer perceives he/she received poor service, the decision about future patronage will be based on that perception. The service organization therefore must understand the concept of service quality from the customers' viewpoint, not from the viewpoint of the organization or service provider (Kurtz and Clow, 2002:104).

The arrangement of fundamental municipal services to all South African residents is one of the essential objectives of the South African government. The 1996 Constitution forces formative obligations on regions with service delivery being key to the role of municipalities (Asmah-Andoh, 2009:101). South Africa as a post-politically-sanctioned racial segregation nation confronts the real difficulties of guaranteeing that municipalities deliver ideal and capable services to occupants of differing societies (Pretorius and Schurink, 2007: 19).

Essential municipal services are there to enhance the well-being and security of the citizens and to add to the economy which, decidedly impacts on the profitability of the tenants. The post-1996 delivery of municipal services in South Africa has not been as powerful and productive as had been expected. Areas of concern incorporate the propriety of the level of service provided, its reasonableness, cost recuperation, operation and maintenance, service delivery, human asset limit and skills, as well as service delivery in support of financial improvement (African Development Bank, 2000:29).

1.5.5 Upstream, Downstream Risk and Supply Chain Risk Management (SCRM)

Risk can be characterized as the exposure to a suggestion of which one is questionable and the probability that the result from a process will not meet expectations (Ranong, 2009). According to Li and Zeng (2014), business risk is the level of exposure to instabilities that the enterprise must comprehend and adequately oversee as it executes its strategies to accomplish its business goals and create value.

There are many risks identified with the auxiliary components of the supply chain. It is observed that researchers concentrate on the risk issues on both sides of supply chain; however, upstream risks appear to get more consideration. This information recommends that supply chains are more vulnerable to supply side risks. Downstream risks, likewise, make a critical contribution which demonstrates instabilities by the market and also demands fluctuations and related risk issues (Singhal, 2011).

Upstream risks are related to procurement and are thought to be threats to supply affirmation, the likelihood of improper supplier selection, as well as uncertainty in supply lead time (Meixell and Gargeya, 2005:531). The key issues of supply risks are observed to be identified with supply system design, the location of suppliers and suppliers' agility, flexibility, delivery dependability and infrastructural quality, as well as coordination and data sharing. This study therefore intends to investigate the dimensions and driving forces of upstream risks, keeping in mind the goal to moderate water supply risks in the future.

Downstream risks, on the other hand, concentrate on two separate components and classify demand issues of market unpredictability, demand change, coordination and data sharing (Boute, Disney, Lambrecht and Houdt, 2007:121). As indicated by Stephan, Sally and Yue (2007:224), coordination and data sharing are some of the measures recommended to oversee the demand side risks. Issues identified with the demand side of water by the district municipality should be considered more in order to manage downstream risks.

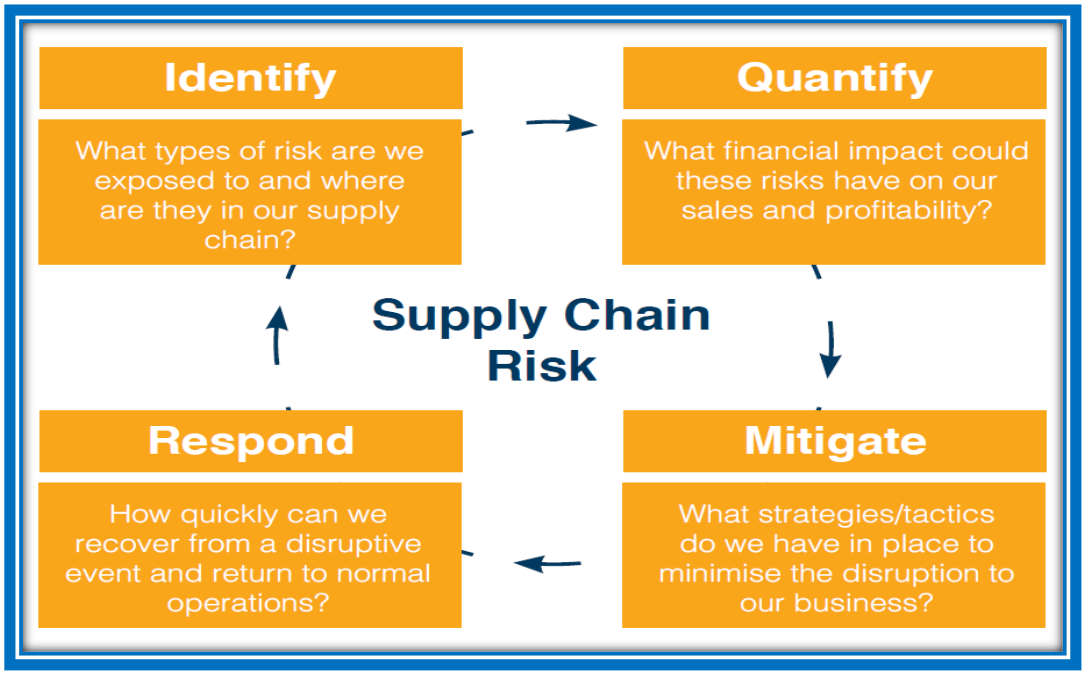
In order to manage the literature review that would give the foundation and premise to the study and to recognize a variety of risks confronting the supply and demand of water in the region of Zululand, the supply chain management framework was utilised.

The context from the framework formed the capacity on which the research was based. A critical part of the research process is to give open meanings of valuable concept (Terr Blanche, Durrheim, and Painter, 2012). This study probed into the Supply Chain Risk Management (SCRM) Framework. This framework is concerned with identifying, exploring analyzing, evaluating, treating, monitoring, reviewing and communicating supply chain risks associated with the supply and demand of water, in order for the supply of water to meet the

demand of the community (responsiveness). According to the structure of this framework, the fundamental concepts associated with supply chain risk management are:

1. Risk identification
2. Risk assessment
3. Risk response
4. Risk monitoring and control

Figure 1.1: Supply Chain Risk Management Framework



Source: (John, 2014)

1.6 Theoretical Framework

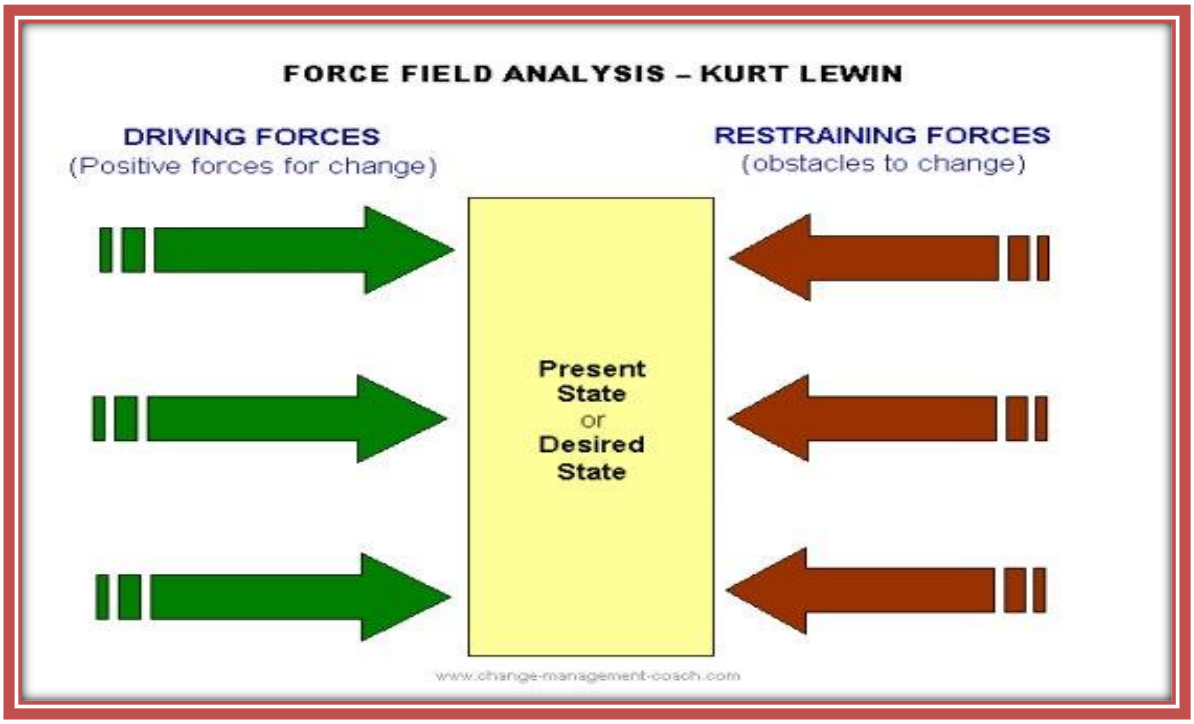
Theories are formulated to clarify, anticipate, and fathom phenomena and, a significant part of the time, to challenge and grow existing knowledge within the limits of basic bounding presumptions. The theoretical framework is the structure that can hold or support a theory of a research study. The theoretical framework displays and delineates the theory that clarifies why the research problem under study exists (Gabriel, 2013).

This study is grounded in the Force Field theory. According to Lewin (1951) “A force field theory is broadly utilised as a part of change management and can be utilised to help

understand most change process in organization. He further states how change is described as a condition of imbalance between driving forces (new personnel, changing markets, new technology) and restraining forces (individual's fear of failure, organizational inertia). Lewin also expresses that an issue is held in balance by the connection of two contradicting sets of forces - those looking to advance change (driving forces) and those endeavoring to keep up existing conditions (restraining forces).

Thomas (1985:54) argues that "despite the fact that force field theory has been utilised as a part of different contexts, it was rarely applied to technique". He also recommends that the force field theory could give new experiences to the assessment and execution of corporate strategies. The force field theory clarifies how strategic supply chains can be mobilized to create value. It suggests that driving forces (external threats combined with internal benefits) must exceed the resisting forces (culture, structure, perceptions of how things should be done) so that any organizational entity- in this situation the supply chain management risks in the supply of water, can change and survive in evolving conditions (Fawcett, Magnan, and McCarter,2008:93). The force field theory in this study aimed to highlight the driving forces, in order to find the supply risks associated with delivering water to the community as a means of demand. It also aims to identify the balance between water supply and water demand.

Figure 1.2: Force Field Analysis



Source: (Connelly, 2016)

1.7 Significance of the study

Many studies have been conducted on SCM and local government, but a very few have concentrated on the SCRM influence in service delivery. The outcomes of this study will offer insights into the supply chain management risks that Zululand District Municipality faces, with regards to delivering water to the community. Propositions have been made in finding remedies for the balance between the supply and demand of water, as well as to develop some kind of innovative knowledge to existing literature on the local government service delivery in Zululand District Municipality. The conclusions and recommendations based on the research findings will be beneficial for decision making bodies to comprehend different problems that are related to the challenges faced by the local government in its efforts towards water services delivery in the Zululand District Municipality. This study should open some new directions, leading future researchers for further studies in the same area.

1.8 Research methodology

1.8.1 Research Design

Creswell (2014) indicates that in order to structure the research as well as to show that all the significant components of the research have been designed to cooperate, a research design is utilised. The research design traces the direction the research will take after, considering the distinctive tools utilised when designing data collection instruments (Cooper and Schindler, 2008:140). This study was exploratory in nature, therefore, a contextual analysis approach was adopted. An exploratory research study alludes to the research that mainly intends to gain knowledge and becoming familiar with a particular circumstance (Bernard and Ryan, 2010). In this study, the exploratory research helped with recognizing supply chain risks related to the balance between supply and demand of water in the regions encompassing the Zululand locale. This study provided a perspective of the Zululand District Municipality and also an outline of the scope and idea of Supply Chain Management, Supply Chain Risk Management and in addition, the distinctive types of risks confronted during the supply of water.

1.8.2 Research Approach

Research methods are classified as qualitative, quantitative or mixed method. Edmonds and Kennedy (2013) assert that qualitative data collection and analysis put more accentuation on understanding how individuals characterize, depict and figuratively comprehend experiences. This permits the researcher to get a point by point viewpoint through interviewing and perception (Denzin and Lincoln, 2005:3).

Qualitative research is for the most part concerned with gaining a more profound valuation for the points of view from the participants on a specific social phenomenon. Through analyzing the contexts of participants by portraying their meaning to contexts, greater understanding is obtained (Creswell, 2013). Additionally, Wilson's (1993:216) attested that the essential objective of qualitative methods in research is to capture what truly matters to individuals and their lives.

Prominently, qualitative research advocates the view that different realities exist and that the participants better comprehend the social phenomenon which is studied (Streubert and Carpenter, 1995:10). In this study, the researcher recognized and underpinned the thought that various realities exist and thus, aims to get a more profound comprehension of these realities.

Through qualitative research, the detailed investigation of phenomena gives rich data from scanty numbers of participants (Crookes and Davis, 1998:119).

This study was qualitative in nature and utilises the case study approach, since it is described by its purpose which is connected to providing knowledge into some aspects of public life and procedures which generate words rather than numbers as data analysis. As indicated by Mouton (2001:149), a case study can be typically applied in studies of organizations, for example, this of a municipality. Cooper and Schindler (2001:140) argue that a case study is of advantage in obtaining in-depth knowledge. It likewise gives valuable knowledge that can aid in problem-solving.

1.8.3 Study Site and Population

A target population is “the whole total of respondents that meet the composed arrangement of criteria” (Sekaran, 2008:271). This study utilised an example of the target population as opposed to the census which includes every one of the components in the population. In the present study, the target population included the Zululand District Municipality.

This study site concentrated on the Zululand District Municipality. This district municipality has five local municipalities which include Ulundi Local Municipality; eDumbe Local Municipality; Uphongolo Local Municipality; Abaqulusi Local Municipality and Nongoma Local Municipality. The focus of the study was at the district level.

1.8.4 Sampling

As per Kvale and Brinkmann (2008), “the number of participants relies upon the motivation behind the study as it decides the approach that the researcher utilises in designing the research”. For this study, the researcher utilised purposive sampling within the extent of non-probability sampling. Remarkably, in qualitative research, the participants can either be excessively few or too much. According to Ritchie and Lewis (2003) “this approach is a method planned to reflect specific attributes of a chosen population”. Edmonds and Kennedy (2013: 46) are of the view that purposive sampling involves "the researcher choosing people to take part on a particular need or purpose in light of the research goal, design and targeted population and this is for the most part usually utilised for qualitative methods". This chosen sampling technique was vital in light of the fact that it permits the research to yield more

noteworthy understanding and knowledge, which turned out to be critical for the achievement of this study. The respondents in this study were intentionally chosen with a specific goal to react to particular questions.

According to Brink (1993:133), “With purposive sampling, the interviewed participants are selected on account of their comprehension of the phenomenon being referred to or in view of their encounters in a specific matter or field”. Their selection is prefaced on the researcher's comprehension of an area and, thus, the assumption that specific participants will have particular knowledge on a specific matter. Along these lines, the respondents were distinguished on the premise of the offices and positions they occupy in connection with the provision of water and in addition, their insights on service delivery and supply chain management in the Zululand region.

Zululand District Municipality is located in the far north region of KwaZulu-Natal, which ends on the Mozambique border. The Zululand District Municipality has the primary responsibility of the provision, maintenance and management of water and sanitation sources. Considering that this study sought to investigate the dimensions of supply risks in the provision of water, it was based at the district level, where responsible and relevant authorities are based. The Zululand District Municipality is structured as follows:

Table 1.2: Zululand District Municipality high-level staff profile

Department	Staff Number	Number selected through purposive sampling
Municipal Manager’s office	5	1
Corporate Services	19	1
Planning and Economic Development	16	1
Technical Services and Infrastructure	4	4
Community Services	28	1

Finance	7	1
Total	**79**	**9**

Table 1.2 above gives an overview of the staff employed by the Zululand District Municipality. Through purposive sampling, nine employees have been selected from the list above for in-depth interviews. The nine employees were purposely chosen because they were deemed appropriate. This will give the researcher the ability to focus the interviews towards knowledge held by different employees across various departments in the municipality. Each of the above-mentioned departments plays a pivotal role in the supply of water, therefore, in order to determine the risks faced by the inadequate supply of water, each department needs to be investigated.

1.8.5 Data Collection tools

Methods are chosen to give the researcher various alternatives when attempting to complete a correct piece of research (Bell, 2010).

1.8.5.1 In-depth Interviews

According to Berg (2009), "Primary data, is gathered to address the particular issue close by, and utilise the techniques that are fit for the particular research". Regarding data collection method, semi-structured in-depth interviews were utilised to conduct the study with the interest of the nine participants within the Zululand District Municipality. The use of semi-structured in-depth interviews were utilised d to permit participants the opportunity to express their perspectives sufficiently and not be restricted by answers that require institutionalized alternatives which permitted the researcher to get more detailed data related to the topic.

1.8.5.2 Secondary Data

Secondary data is data that has been gathered by different researchers, in some cases for reasons other than research, for example, books, regulatory records and so forth by organizations' (Saunders, Lewis and Thornhill, 2012). As an approach to expand dependability right now, there is a utilisation of literature extracted from past papers and journals in the fields of SCRM in local government service delivery.

1.8.6 Data Analysis

According to Berg (2009), “Data analysis is characterized as a procedure of investigating the data that has been received and transforming it into critical pieces of knowledge”. According to Anderson (2007) “a thematic analysis is a descriptive presentation of qualitative data”. Qualitative researchers usually transcribe data that the researcher has assembled in interviews, voice recorders and memos utilizing Microsoft word.

In this study, the data collected was analysed utilizing thematic analysis. This analysis is a way to deal with managing information that includes the creation and utilisation of "codes" to the data (Creswell and Plano Clark 2007:88). ‘Coding’ alludes to the formation of categories in connection to the data, in other words, the grouping together of various cases of datum under an umbrella term that can enable them to be viewed as of a similar type.

For the purpose of this study, data was recorded by making manually written notes and by audio-recording the interviews to be transcribed later. Data analysis should appear as the accompanying stages: the coding of the findings of primary studies; the organization of these codes into related areas to build descriptive themes; and, the advancement of analytical themes. The process of translation, through the advancement of descriptive and analytical themes, was done thoroughly that encouraged transparency of reporting.

1.8.6.1 Data Quality Control

Data quality control is concerned with the trustworthiness and credibility of the data that is accumulated; it evaluates the outcomes acquired as far as their similitude and checks if the outcomes might be for the most part relevant to the whole population (Sekaran, 2003:66). Qualitative research endeavors to give an in-depth perception of a phenomenon (Koonin, 2014). Subsequently, the utilisation of the ideas of dependability in qualitative studies is utilised to measure trustworthiness and credibility.

Krefting (1991) considers trustworthiness in qualitative research as the capacity to present data findings and results in a sound, valid and objective manner. In this study, the researcher as a key instrument was objective as conceivable during the time spent gathering data and in the way that the interviews were structured. Along these lines, in this segment, the researcher

quickly highlights a portion of the fundamentals of trustworthiness that approve the methods and approach that will be utilised as part of this study.

1.9 Ethical Consideration

Research that includes human subjects or participants raises unique and complex ethical, legitimate, social and political issues. Research ethics is particularly inspired by the investigation of ethical issues that are raised when individuals are included as participants in research (Walton, 2010). Hitt (2008:359) expresses that ethics alludes to rules or standards for administering the connection between individuals to benefit all concerned, with shared regard for the requirements and needs of all people included. The researcher will apply for ethical clearance to the committee at the University of KwaZulu-Natal before any form of primary research undertaken. Confidential information from the research will be kept private.

1.10 Dissertation structure

Chapter 1: Introduction

Chapter one provides an introduction and a synopsis of the study. Aspects discussed are the rationale of the study, background of the study, objectives of the study, key research questions, limitations of the study, and an overview of the chapters.

Chapter 2: Literature Review

The theoretical framework of the study is provided. The concept of supply chain in both the private sector and public sector is analysed. This section also discusses the different types of risk in supply chain risk management and how the issue of water supply can be overcome with the balance between actual demand and actual supply. This chapter aims at generating information intended to address the objectives of the study.

Chapter 3: Research Design and Methodology

In this chapter, the research methodology used will be outlined along with the data collection techniques put into place to generate information. Further to the research methodology and research techniques being outlined, the researcher's choices of data analysis will be justified and discussed.

Chapter 4: Analysis and Presentation

The purpose of the chapter is to analyse the primary and secondary data used during the study in order to draw relevant conclusions. The thematic data analysis technique was implemented. This chapter carries out an in-depth discussion of the main findings derived from the data and how these relate to the main objectives and questions of the study.

Chapter 5: Recommendation and Conclusion

This chapter focuses on describing the conclusions that were reached after analyzing the data and considering the relevant literature presented in chapter 2 and 3. The conclusions provided in this chapter are intended to establish the dimension of supply risk in the supply of water.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter discusses in detail the concept of Supply Chain Management (SCM) both in the public sector as well as in the private sector and this is discussed inclusive of its definitions. Literature sources related to the driving and restraining sources of the scarcity of water and water supply are reviewed. The applicable literature in this regard was ascertained from government sources, internet, journals, previous research and books. The purpose of this chapter, therefore, is to link theory to both the research problem and research objectives of the study.

Although water is essential to life on earth, only 2.5% of the world's water is freshwater. Historic water sources are drying up as a growing number of companies, cities and individuals compete for water (Chabot Space, 2014). For the family, a day would be unpleasantly troublesome without this life enabling commodity. For instance, individuals would not be able to brush their teeth or wash themselves. The human water prerequisites are much more than it can be expected. Indeed, water contains fifty to seventy percent of the grown-up weight. Water is not just for nourishment. On the contrary, it is a synthetically characterized particle which constitutes a core nutrient fundamental for the wellbeing and survival of individuals.

The human body has no arrangement for water deficiencies as must be highly compromised without water (Wenhold and Faber, 2009: 61). It is clear from the above information that water is an irreplaceable commodity for individuals. How might the circumstance be if there was no water in the family units? Everything would be filthy in the house and drinks will be no more. This would be a circumstance where it wouldn't be feasible for one to prepare one's best meal (Explore More: Water Quality, 2004:2).

In view of the information above, this chapter concentrates on supply chain risk management as well as the legislation overseeing water supply in South Africa with specific focus on the Zululand region. The Constitution of the Republic of South Africa of 1996 will likewise be assessed in support of the enactment of water management. Furthermore, the theoretical

framework diagram is a supportive measure towards fulfilling the objectives of the investigative enquiry relating to supply risks in the supply chain risk management.

2.2 Supply Chain Management (SCM)

SCM consists of various types of organizations, among which numerous network connections are formed. It involves the management of material goods and information (Szymczak, 2013:24). SCM is approached from different disciplines such as logistics, purchasing, transportation, operations management, marketing and research. There is a broadly shared perspective of SCM definition that is referred to in Stock (2009:148) by the Supply Chain Management Council of Professionals (SCMCP) who trusts that the idea: "Encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and logistics management activities". The important features in this definition include "coordination and collaboration with channel partners, which could be suppliers, intermediaries, third-party service providers and customers".

Christopher (2016) defines SCM as: "The management of upstream and downstream relationships with suppliers and customers in order to deliver superior customer value at less cost to the supply chain as a whole. Thus, the focus of supply chain management is on the management of relationships in order to achieve a more profitable outcome for all the parties in the chain. This brings with it some significant challenges as there may be occasions when the narrow self-interest of one party has to be subsumed for the benefit of the chain as a whole".

Additionally, Hanfield, Monczka, Giunipero, and Patterson (2009) as mentioned in Alfalla-Luque and MedinaLopez (2009:204) define SCM as: "the integration of all the activities that relate to the flow and transportation of goods, including associated information flows, from raw materials stage right through to the end user by means of improved supply chain relationships, in order to achieve a sustainable competitive advantage".

The SCM definition that collectively incorporates every single distinctive process, activities, linkages and critical role players (supply chains) in SCM is the one proposed by Stock and Boyer (2009) referred to in Stock (2009:148) where the authors subjectively investigated 173 interesting definitions from literature distributed from 1985 to 2008 and concurred that the

idea could be characterized as: “the management of a network of relationships within a firm and between interdependent organizations and business units consisting of material suppliers, purchasing, production facilities, logistics, marketing and related systems that facilitate the forward and reverse flow of materials, services, finances and information from the original producer to final consumer, which benefits of adding value, maximizing profitability through efficiencies, and achieving customer satisfaction”.

The best organizations around the globe have found a capable new source of competitive advantage. It is called Supply Chain Management and it includes those integrated activities that put up products to market and create satisfied customers. SCM incorporates themes from assembling operations, purchasing, transportation and physical distribution into a unified program. Successful SCM at that point organizes and coordinates every one of these activities into a consistent procedure.

Agrawal (2015) additionally declares that within the association, the supply chain alludes to a scope of functional areas. These incorporate SCM-related activities, for example, inbound and outbound transportation, warehousing and stock control. Sourcing, procurement and supply management fall under the supply chain umbrella as well. Forecasting, production, planning and scheduling, order processing and customer service are all part of the procedure as well. Critically, it additionally typifies the information systems so important to monitor these activities.

In recent years, organizations have progressively concentrated on methodologies that are geared towards advancing execution of their operations and inside procedures in an attempt to meet customer demands by proficiently using assets and expanding incentive for money. It is in this regard that SCM has re-molded the way in which organizations work and has immensely added to the delivery of significant services and added items to customers by accomplishing product accessibility, adaptability, cost-viability and quality (Chopra and Meindl, 2007:23).

Generally, SCM gives assurance that increased efficiency, effectiveness and competitiveness occur to accomplish the best results. This implies that for organizations to have the capacity to flourish and be successful, they need to actualize techniques and methodologies to enhance

execution. These convincing conditions in the implementation of SCM practices do not only create a continued supply base and suppliers that comprehend customers, but also guarantees that product sustainability is accomplished (Mhlongo, 2014).

Chen, Defee, Gibson and Hanna (2014:6) are of the view that SCM plays an important role in creating value to customers, product accessibility at lessened costs, delivery of procedures that are coordinated to accomplish optimal execution and enhanced responsiveness in meeting customer demand. It is thus obvious from this discussion that the concept of SCM has essentially added to enhance the way in which resources are used to provide quality services to customers.

Similarly, LeeGon and Kim (2014) aver that supply chain maximizes overall value in an organization. This depends on the actual value created through supply and demand whereby a relationship exists between the value of the final product and its value to the customer contrasted with the actual cost occasioned by the supply chains in response to the needs of the customers. Be that as it may, the achievement of a supply chain is firmly associated with the accomplishment of the management of the supply chain flows.

Bowersox, Closs and Cooper (2007:79) point out that in a competitive domain, organizations would keep on flourishing for as long as they give quality products and services. The factor that determines this achievement is the capacity of the products' durability and the execution contrasted with how it is intended to perform. Fundamentally, SCM creates an opportunity for organizations to go past concentrating more on buyer-seller operations rather than on maintainability.

The perspectives of various authors are captured to make a more prominent comprehension of the idea of SCM and its diverse definitions to recognize essential similitudes and contrasts. These distinctive perspectives are reliably checked for key components of procedures that supply chain utility to give quality products to meet particular customer needs in an efficient and cost-effective manner. There ought to be prominent on the standard of transparency which serves as an essential prerequisite in guaranteeing that accountability and reliability are kept up in SCM processes. Moreover, it is critical to investigate meanings of SCM in connection with the public sector and the private sector point of view.

2.3 Supply Chain Management in the Private Sector

The idea of SCM has its origins in the private sector since the start of the 1980s (Emmett and Crocker, 2016). This view is upheld in the business literature which conceives of the meaning of SCM as the control of materials, information and finances as they move procedurally from the supplier to the manufacturer proceeding to the distributor and to the retailer and lastly to the customer. In today's global competitive private sector condition and contracting spending plans in the public sector, supply chain management is becoming progressively vital. Supply chain management is a competitive procedure for coordinating the supplier/customer relationship to productively deal with the procurement and delivery of goods and services in a cost-effective manner with the specific goal of enhancing responsiveness and adaptability in organizations (McCue and Pitzer, 2008: 35).

In the private sector, the obtaining of products and services represents over 60% of the aggregate working expenses for most organizations (Oakland, 2014:306). The pattern of seeking the private sector for supply chain management procedure and key supply chain components for execution in the public sector part is obtaining popularity in the present literature. However, various authors have contended that although the interest is for cross-sector usage of supply chain management, significant contrasts in the utilisation of supply chain management amongst public and private procurement professionals are not distinguished. In particular, research that distinguishes similarities and contrasts in organizational approaches to deal with procurement and supply chain management amongst public and private sector organizations is deviant from the present literature (Hawkin, Gravier and Powley, 2011: 567). Various authors have examined organizational issues and factors tied to supply chain management in the private sector to gauge their potential for implementation in the public sector (Heller, 2013: 110).

Key contrasts exist between the public sector and the private sector in detailing structure, regulatory bodies, financing sources and operational processes (Matei, 2015:504). Public procurement differs from private procurement in scope. In the private sector, the procurement procedure is driven and lined up with corporate income and profit goals - the bottom line. The government is regularly seen as a market regulator which once in a while encourages markets through competition law, or limits them through the lowest wage permitted by laws. However,

the government plays an inexorably imperative role as a dynamic participant in the market itself (The World Bank, 2014:23). In the public sector, procurement has been used as an imperative tool in accomplishing financial, social and different goals and objectives.

The mission of the procurement function, in the public and the private sector organizations, is to proficiently deal with the forecast, procurement and delivery of goods and services through the supply chain in a cost-effective way. Despite the colossal potential that the incorporation of the supply chain management components holds for the public procurement, a careful investigation of the differences amongst public and private sector procurement is fundamental before cross-division implementation takes effect (Heller, 2013:108).

2.4 Supply Chain Management in the Public Sector

SCM was presented in the South African public sector as a measure to mitigate the inadequacies in the supply chain management with the goal of accomplishing good governance and economic development. Each government unit was to develop an SCM policy to suit its needs (Sehoa, 2015:112). The public sector is one of the most essential customer groups for some suppliers and service providers. This is because of the size of the sector and the volume of public expenditure (Dlamini, 2016). Relationships with customers have dependably been thought to be critical in business management. Supply Chain Management in the Public Sector is of vital importance to this study because the municipality to be investigated falls under it. Therefore, this section will be utilised accordingly.

Bent (2014) defined SCM public sector as: “An integral part of Financial Management that seeks to introduce internationally accepted best practice. It bridges the gap between traditional methods of procuring goods and services and the balance of the supply chain whilst addressing procurement related matters that are of strategic importance”.

According to Attaian (2004): “An effective public sector SCM has potential benefits such as inventory reduction, improved service delivery and cost reduction across the supply chain. Besides benefits, the South African public sector continues to encounter challenges in the supply chain”. Overall, government administrations have the responsibility of delivering goods and infrastructure (roads, ports) and services (health care and education) to its populations (Chemoiywo, 2014). Ambe and Badenhorst-Weiss (2012:244) delineate public

sector SCM as being the: “Function whereby public sector organizations acquire goods, services and development and construction projects from suppliers. Goods and services should be acquired in line with the general principles of fairness, equitability, transparency, competitiveness and cost-effectiveness enshrined in s217 of the Constitution” (Republic of South Africa, 1996, s217). All things considered, procurement is integral to the government service delivery system as it involves vital activities that support service delivery (Ambe and Badenhorst-Weiss, 2012).

Procurement in government is a managed and open process characterized and controlled by various laws, guidelines and regulations, legal and administrative decisions, policies and procedures (Maiketso, 2015:21). Van Weele (2010:106) observes that procurement policies in the public sector are informed and obliged by particular conditions, for instance, the need for public responsibility, the way that public entities are not subject to the rules of the free market and the need for particular financial management procedures in government.

In South Africa, public procurement alludes to activities identified with the purchasing of goods and services that the public sector requires from the private sector (Mhlongo, 2014:34). The main objective of the public procurement is to purchase goods and services at the most minimal conceivable cost from appropriate suppliers while maintaining the accepted standards of quality. Purchases by the public sector represent a significant measure of public resources spent and are a substantial source of income to the private sector (Moeti, Khalo, Mafunisa, Nsingo and Makondo, 2007:122). In light of this, the public sector has recognized the need to use the substantial amount of public resources spent by making procurement a tool to accomplish financial advantages.

The idea of procurement has advanced quickly amid the most recent decades. Concepts and methodologies, for example, supply management; strategic sourcing and SCM now exist. Not only are public procurement officials confronted with these new improvements when leading business with the private sector, but they are also under pressure to grasp these new methodologies. Institutions in the public sector are required to deal with their funds efficiently, especially in procurement, which is evident from the Public Finance Management Act of 1999, preferential procurement regulations and the SCM structure.

These developments have extended out to the public sector whereby delivery of fundamental services has turned out to be vital to government performance in addressing the needs of the citizens (Pauw, Woods, Van der Linde, Fourie, and Visser, 2009:249). Thus, the systemic activities integrated into SCM have turned out to be obligatory in recognizing the particular needs of the more extensive society. These use innovative techniques to accomplish the arrangement of basic services by persuading service providers to create a cost advantage to the organization. In this way, the literature that exists shows that the significant determinants of an enhanced and compelling supply chain in the public sector are affected by the nature of service provided in meeting the expectations of the citizens and the more noteworthy in the management of state resources (Ambe and Badenhorst-Weiss, 2011:1100).

Nelson (1997:82) is of the view that the significance of government procurement processes is the advantage of best aggregate cost because of the competitive nature in the acquisition of goods and/or services. Henceforth, the accessibility of alternatives that are less tedious and less bureaucratic to deliver services for the government to meet customer requirements is seen as a sound public policy. Nelson (1997:83) indicates that the government tends to depend on the aptitudes from the private sector in providing the required goods and services due to the guaranteed propelled technology, higher responsibility and efficiency in the execution of its obligations.

Ambe and Badenhorst-Weiss (2011:1103), however, are of the view that effective SCM is accomplished when suppliers in charge of procuring goods and services are authoritatively bound in satisfying their commitments to the government. From the South African viewpoint, the procedures that occur in government SCM include the cooperation of critical parties required in the delivery of services as per the South African National Treasury Regulations that provide guidelines for proper implementation of the SCM policy (Dlomo, 2017).

Essentially, with the private sector SCM, the government processes start with an underlying demand from the citizens (customers) and the final arrangement of goods and services are connected systematically and comprehensively by internal procedures (Pauw *et al.*,2009:249). This implies that the public sector SCM processes are coordinated in light of linkages and connections of key role players. Ambe and Badenhorst-Weiss (2011:1103) concur with this view and add that this procedure is dictated to by specific selection criteria of service

providers connected with the procurement processes that are guided by good governance standards.

Generally, public procurement puts at its centre the standards of good governance to have effect on its significant partners and the more prominent public. In light of this discussion, there are key underlying similitudes that are observed in the implementation of mechanisms to either respond to customer demands in the private sector and to meet the basic needs of citizens in the public sector.

2.5 Force Field Theory

Force Field Analysis is a method for listing and assessing the forces for and against a circumstance. It encourages one to examine all the forces that have an impact on the present circumstance. Human behavior is caused by forces – beliefs, desires, social standards and so on. Some of these forces are positive and thus drive us forward whereas some of these forces are negative and thus keep us from accomplishing the objectives that are set. A force field analysis diagram exhibits these main driving forces and restraining forces that would impact on an issue. Thus, a force field diagram can be utilised as part of a wide range of circumstances that happen in life from various perspectives (Mind Tools, 2014).

Figure 2.1: Force Field Analysis Example

Source: (Mind Tools, 2014)

Changes in the working environment actually create instability and can be emotionally challenging for representatives. Change, especially when it is startling, can undermine certainty and debilitate the ability to reason (Holbeche, 2006). The demand for water implies that the municipality works in a constantly changing environment and should thus consistently adjust to various demands, new technologies, government policies and other developments like lean and agile practices in the supply chain department and every single other office relating to the supply of water. In spite of the fact that the responsibility regarding better approaches for working is pivotal to deliver high-quality water, officials may feel that change is forced on them and that their insights are not taken into consideration.

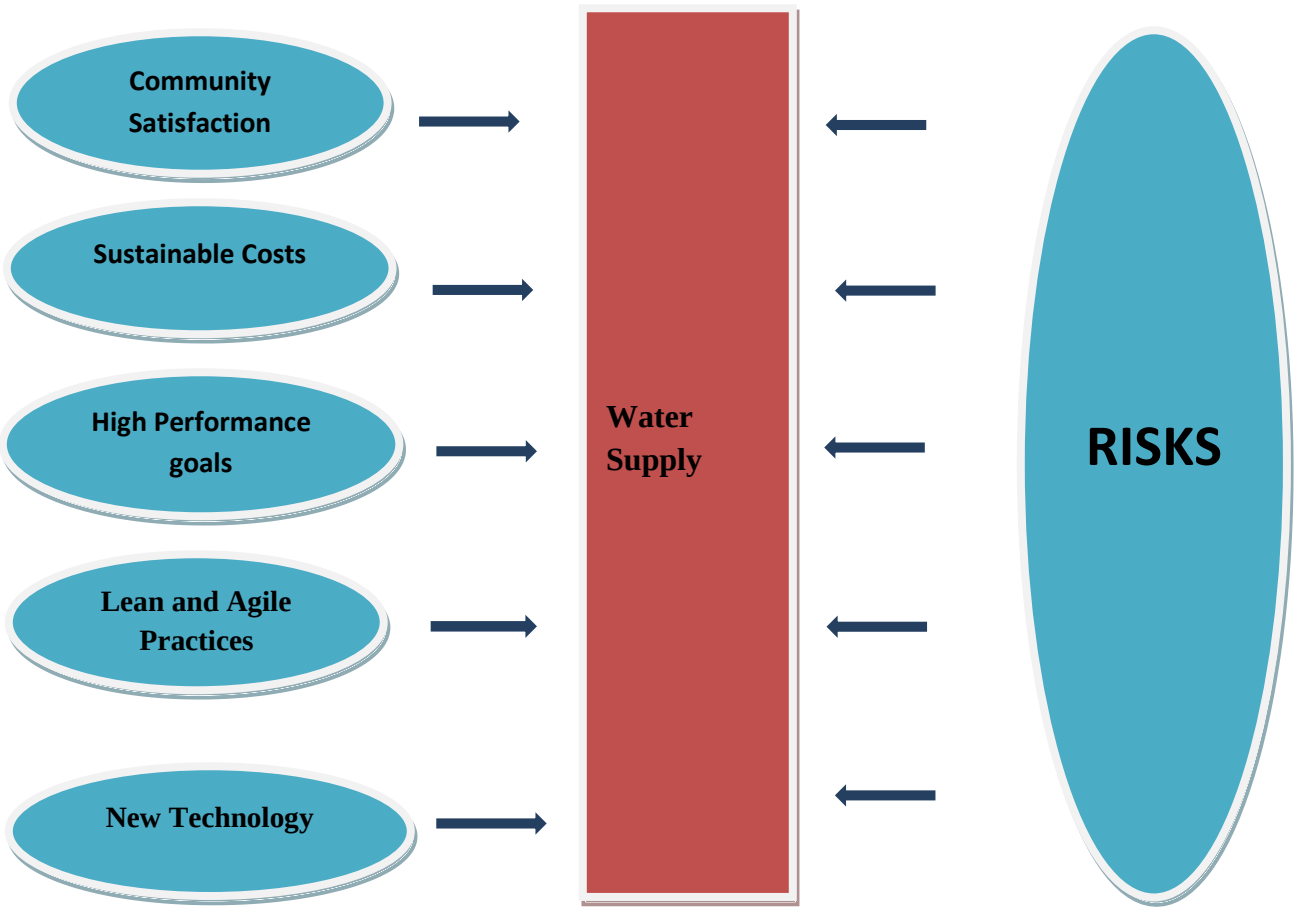
This discernment does little to enable them to possess changes happening and to adjust behaviors to maintain practice enhancements. While managing change, it is vital to relate to individuals and diminish the conceivable resistances they will have in tolerating better approaches for practicing (Hillman, 2014). Bridges (2017) argues that effectively driving change implies helping individuals to grasp the difficulties to the point where they positively acknowledge and psychologically own better approaches for practicing.

2.5.1 Identifying the Factors Influencing the Change in Water Supply

This phase concerns itself with analyzing and understanding the factors that drive the need for change and recognizing those elements that have the potential of preventing or challenging the municipality from successful implementation. Lewin's (1951) force field analysis model can be utilised and analyse the driving forces and the restraining forces to the proposed change so as to decide the magnitude of the gap between the municipality's present and desired states. It is contended that this approach can give new bits of knowledge into the assessment and implementation of corporate systems. Lewin's force field analysis is especially useful for establishing an all-encompassing perspective of the change circumstance in as far as the driving and restraining forces are concerned. This analysis will thus illuminate the essential responses (Makgatho, 2015).

The diagram below is a simple illustration of a force field analysis of the Zululand District Municipality with regards to the supply of water. The aim of the study was to establish the restraining forces which would eventually lead to change. This diagram was drawn up by the researcher to aid with establishing the balance between the demand for water and its supply and to establish change management within the system of the municipality.

Figure 2.2: Force Field Analysis – Zululand Water Supply



Source (Researchers Perspective)

2.6 Supply Chain Risk Management

Supply chain risk management has been progressively enticing attention from academic researchers. However, for the most part, the concepts are still under development and many continue to be without a generally accepted definition (Vilko and Hallikas, 2012). Many researchers in the field of SCM have defined SCRM. Jüttner (2005:124) defines supply SCRM as: "The identification and management of risks of the supply chain, through a coordinated approach amongst supply chain members, to reduce supply chain vulnerability as a whole".

Lavastre, Gunasekaran and Spalanzani (2012:830) define SCRM as: "The management of risk that implies both strategic and operational horizons for long-term and short-term assessment". However, the most common classification of SCRM is that of Pujawan and Geraldin

(2009:953) which states that “SCRM aims to reduce the probability of risk events occurring and to increase resilience, that is, the capability to recover from a disruption”.

Furthermore, according to Wieland and Wallenburg (2012:890), “SCRM is defined as the implementation of strategies to manage both every day and exceptional risks along the supply chain based on continuous risk assessment with the objective of reducing vulnerability and ensuring continuity.” According to Jereb, Cvahte and Rosi (2012:272) risk is: “A process that supports the achievement of supply chain management objectives through the whole supply chain, not only in a single company”. In order to understand supply chain risk management, it is fundamental to comprehend the characteristics of risk. As indicated by Wang (2014:91), risk in a supply chain is a threat that something may occur to disrupt normal activities and stop things occurring as arranged. While SCM is the function in charge of the transportation and storage of materials on their journey from the original suppliers by means of intermediate operations to the final customers (Waters, 2007), supply chain risk management aims to recognize the potential sources of risk and actualize appropriate activities to avoid or contain supply chain vulnerability.

SCM as a discipline has seen a tremendous development amid the recent two decades. This development has been construed in relation to the modeling and analysis of different issues emerging because of the advancement of complex networks among various organizations not only within countries as well as over the globe. These issues are predominantly identified with designing, arranging and coordinating the material, information and money flows over the supply chains. However, attributable to expanding dynamism and uncertainty in the business risk issues are becoming key concerns to the organizations.

The risks in supply chains arise predominantly due to:

(a) operational variations such as inconsistency in supply, demand uncertainties, and price inconsistency (Jabbarzadeh, Fahinnia and Sheu: 2017),

(b) natural events such as earthquakes, hurricanes, epidemics and

(c) Manmade crises such as terrorist attacks, unethical business practices and economic recessions (Kleindorfer and Saad, 2005).

Furthermore, cultural, infrastructural and political contrasts and the trend towards methodologies, for example, outsourcing, single-sourcing and lean practices have additionally made the supply chain vulnerable to risks (Chopra and Sodhi, 2014). Risk is the possibility, in quantitative terms, of a characterized danger happening. It consolidates a probabilistic measure of the event of the essential occurrence with a measure of the outcomes of that event (Rajesh, Ravi and Rao, 2015). Risk is a quality that reflects both the range of possible outcomes and the distribution of particular probabilities for each of the outcomes.

Effective management of risks is becoming the central concern of the organizations to survive and flourish in an aggressive business condition. Subsequently, the SCRM has developed as a characteristic extension of supply chain management with the prime target of distinguishing the potential sources of risk and suggesting appropriate action plans to mitigate them. Services are expanding extensively in the supply chain operations. The aim of service supply chain risk management is to comprehensively alleviate the risks to the supply chain (Vilko and Ritala, 2014: 118).

Managing risk in supply chains appears to have risen as an imperative topic in SCM. These incorporate an increased strategic outsourcing by firms, globalizations of business sectors, expanding dependence on suppliers for specialized capabilities and innovation, reliance on supply systems for competitive advantage and the emergence of information, technologies that make it possible to control and organize extended supply chains (Narasimhan and Talluri, 2009:116).

There are different types of supply chain risks, particularly in public sector supply chain. These include the following: financial risk; strategic risk; operational risk; human resources risk; technological risk; fame risk and lastly, law risk. Firstly, financial risk is a kind of risk which designates that the organization does not have sufficient money to meet its monetary obligations. If the organization uses a loan or credits, it should be able to compensate it back in due time, or else it will face financial risk (Brindley, 2017:166). Secondly, strategic risk means both current and future profit of an organization. This kind of risk is subject to the companies' premeditated targets. When the business strategies advance and fix resources are against them, strategic risk will appear (Sadreih and Voigt, 2017:125).

The third risk is operational risk. Currently, organizations demand to upgrade the procedures for dimension, monitoring and the decrease of operational risks. For example: the results emanating from ineffective developments or a few equipment, incompetent employees and systems in external accidents, damages brought about from procedures, improper personnel and malfunctioning systems or accidents due to the corporations outside factors are those to be mentioned (Gomez, Duque and Rivera, 2017:208). Fourthly, there is human resources risk. There are two kinds of human resources risks: The first risk is the absence of qualified persons in order to apply management programs and the second risk is the significant essential strategy section to connect with risks is the intelligence of those who have to deal with unforeseen coincidences (Erven, 2007).

The fifth risk is technological risk which is informational systems and administrative activities, computerization, developments reimbursement, misunderstanding of shareholder's role and technology's position. These risks should be predictable earlier and there should be a set of actions to avoid the serious problems emanating from them to be considered later on (Chopra and Sodhi, 2015:78). Fame risk is the sixth risk which has been defined as a present or impending risk for earning and increasing capital from different perspectives of financial firms and profitable recipients. The duty of all employees is to keep organizational fame (Fiorino, 1989:501). The last risk is laws risk. At any environment which is unpredictable, these regulatory laws can give assurance regarding the fact that documentation, administration and control of any kind of controlling risks, now and in the future will be done. Control teams on laws are including controlling proficiencies and distinctive risks management. Not only do they know laws, but have also been trained to contrast, implement and assess risks (Samvedi, Jain and Chan, 2013).

Figure 2.3: Risk in the extended Supply Chain

Source: Mentzer (2004:138)

The above diagram is an outline demonstrating supply risks which are caused by an event occurrence related with inbound supply that may cause failure from the supplier to such an extent that the outcome result of the organization to meet customer demand within foreseen expenses or causes threats to customer life and wellbeing (Scholten and Fynes, 2016:413). This diagram is particularly important in this study because it identifies how the risk associated with the supply of water hinders the demand side of water causing dissatisfied customers in the region.

In light of the above literature on risk and SCRM, in terms of SCRM in its relation to water supply, it is important for one to delineate SCRM as the identification and evaluation of risks and consequent losses supply chain and implementation of appropriate strategies through a coordinated approach among supply chain members for supply chain outcomes that lead to close matching of actual supply with actual demand (Musa, 2015:45). From this definition, Manuj and Mentzer (2008:144) suggest five steps of risk management:

(a) Risk Identification

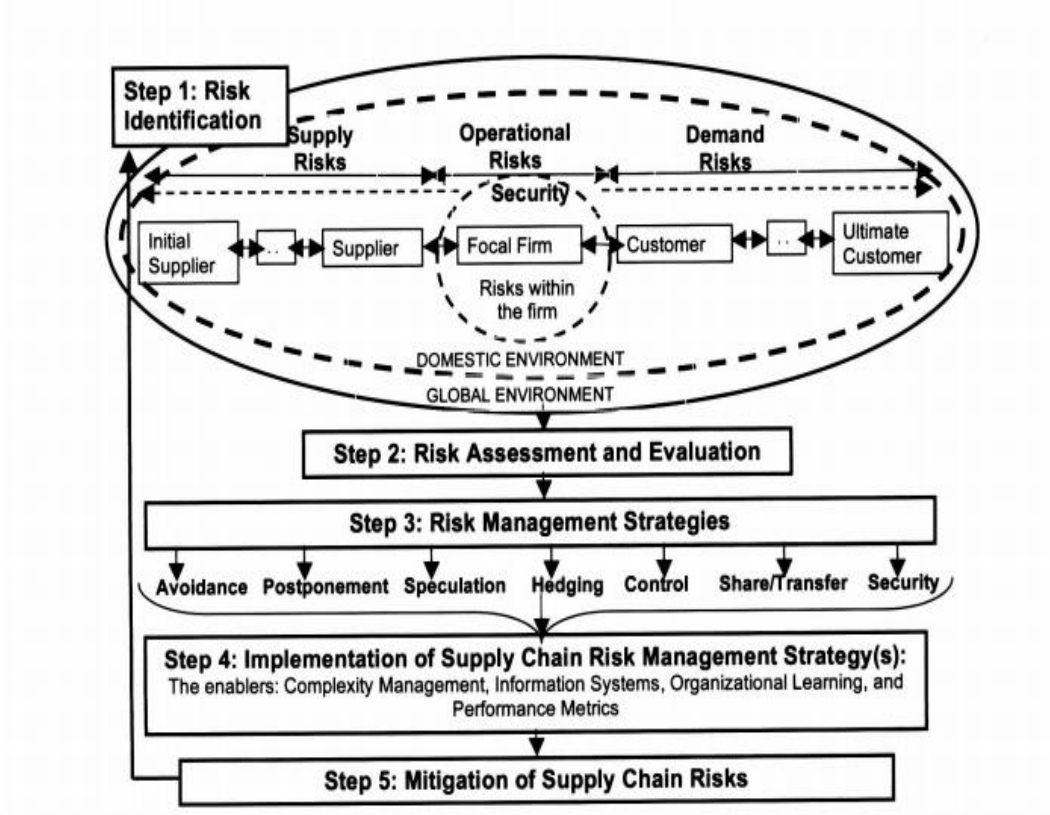
(b) Risk Assessment and Evaluation

(c) Selection of appropriate risk management strategies

(d) Implementation of supply chain risk management strategies and

(e)Mitigation of supply chain risks.

Figure 2.4: Global Supply Chain Risk Management and Mitigation Framework



Source: Manuj and Mentzer (2008:144)

Furthermore, additional researchers have recommended a variation of risk management steps. According to Pettit, Croxton and Fiksel (2013:46), 'supervise and review' had to be included as the last step to the idea of Manuj and Mentzer (2008:133). Hallikas, Karvina, Pulkkinen, Virolainen and Tuominen (2004:47) only consider the steps into four distinguishing stages (1) Risk Identification; (2) Risk Assessment; (3) Risk Response; and (4) Risk Monitoring, which is in line with Zsidisin and Wagner (2010:20) who combine the risk management process.

2.6.1 Risk Identification

Risk identification is the process of analytically identifying all possible risk events which have an impending impact on the project. Identifying and distinguishing applicable supply chain risks is the first step in the SCRM. Risk identification is also an essential phase in risk management practice (Hechmann, Comes and Nickel, 2015:119).

By distinguishing the risks, a decision-maker or a group of leaders end up being noticeably cognizant about the events or phenomena that cause vulnerabilities. In the process of risk identification, risk factors and risk sources of the supply chain are revealed and at that point we can classify risks into different kinds and such grouping can enable us to establish potential instabilities which will bring about misfortunes in the supply chain. In this study, the supply chain risks are divided into two distinctive classes: external risks and internal risks. External risks (that is, those external to the organization) are environmental, demand and supply-side related. Internal risks are those concerning the municipality's operations such as transportation, operations, possession and control risk (Kilubi, 2015). Once risks are recognized, supply chain specialists face the subsequent challenge of assessing these risks in order to develop the appropriate risk management strategy.

2.6.2 Risk assessment

Risk assessment is a methodical procedure of assessing the potential risks that might be included in an anticipated activity or undertaking. Risk assessment is related to the likelihood of an event happening and the significance of the outcomes (Ouabouch, 2015). In the past decade, various risk assessment techniques have risen, particularly for supply chain risk assessment. The evaluation of supply chain risk is critical in light of the fact that it concentrates on essential risks and could be viewed as references for methodology decisions.

In the study, risk assessment includes managers evaluating the exposure of the municipality to each risk factor and more often than not includes measuring the expected misfortunes and the standard deviation of misfortunes over a period of time. This progression creates the correct forces for the municipality to support. Another parameter here is the sensitivity of the ZDM to the different risk factors. Fundamentally, risk assessment is identified with whether risk can be measured objectively (Burgon, 2013) which likewise brings up the issue of whether risk in the supply of water is objective or not. The risk assessment can likewise be 'formal to informal' or 'quantitative to qualitative', aside from the objective nature (Zsidisin *et al*., 2004:398).

2.6.3 Risk Response

The third step in the risk management process is the risk response which is also called risk handling. Contingent upon the sort of risk, enterprise, supply chain, and objectives, the representatives of the organization’s select systems and measures to moderate the prioritized

risks. When choosing the risk response techniques and measures, the costs for their usage and occurrence of further potential risks ought to be given due consideration. Hoffman, Busse and Bode (2014) offer guidance on the possibilities of lessening, transferring, exploiting or eliminating risks. Berg (2010:85) specifies many types of information risk and provides the best practices in his second contextual analyses. In this regard, the following serve as typical examples: overseeing potential risks proactively, engaging in continuous project risk management processes, effectively assessing risks and dangers, to mention but a few. Risk response can include one or a combination of risk acceptance, risk prevention, risk avoidance, risk sharing, risk transfer, risk mitigation or reduction and risk control (Spikin, 2013:24).

Thus, determining the fitting response technique to start with and then designing responses to implement the chosen strategy is vital. This stays away from the 'scatter-gun' approach where many alternative responses might be proposed some of which may refute the impact of others. Initially deciding the technique could guarantee that the responses aim for a similar objective and thus maintain a strategic distance from worthless exertion. There is no single best response procedure and each risk ought to be considered on its own merits. A few risks may require a combination of procedures and numerous responses, though others may require just a single system with a solitary reaction (Peter, Hilson David and Ken, 1997).

The selection of a strategy ought to be driven and construed as a type and nature of the risk, reasonability and responsiveness to diminishment or control, the level of seriousness of the effect, accessible resources and cost-effectiveness. It is recommended that risk avoidance techniques ought to be considered as the primary alternative since it is obviously best to remove risk completely if possible. Risk transfer ought to be investigated and secondly despite the fact that the degree for this is regularly restricted. Thirdly, risk sharing ought to be utilised as part of trying to allocate fractional responsibility for risk to another party. The fourth decision is risk mitigation, looking to diminish risk exposure; leaving risk acceptance if all else fails for residual risks which can't be addressed by other methodology. Having chosen the suitable system, consideration would then be given to the development of strategic responses which target individual risks and aim to understand the strategy adopted or considered for adoption.

2.6.4 Risk Monitoring

Risk monitoring is the constant procedure of following and assessing the risk management process by metric reporting, undertaking criticism on watch list items and standard enterprise input on potential developing risks. The output of this procedure is then dispersed throughout the enterprise so that each one of those associated with the program become aware of the risks that influence their endeavors and the system development in general (Economy and Finance, 2014).

Risk monitoring and control are there to review whether the measures have been applied and also establish the extent to which they have been compelling. If necessary, additional measures should be taken particularly when changes occur in the environment. A strategy which can be applied within the risk control step is, for instance, the balanced scorecard (Singer, 2012). Control is the ponder utilisation of the design process to bring down the risk to satisfactory levels. It requires the disciplined application of the systems engineering process and detailed knowledge if the technical area is associated with the design.

2.7 Service Delivery and Legislation Governing Water

This section unpacks local government reformation and transformation in South Africa, with particular reference to the Zululand district as well as to look at and understand legislation governing water in the Republic of South Africa.

2.7.1 Service Delivery

The citizens of South Africa voted in free and reasonable elections on April 27, 1994, for the new administration. They repeated this procedure in 1999, 2004 and 2009. These decisions bear solid declaration to the democracy of the nation. The new government was entrusted with the obligation of guaranteeing a superior life for all. In the course of recent years, the legislature has done much to create a democratic, non-supremacist, non-sexist South Africa that addresses the issues and meets the needs of all people. Be that as it may, many difficulties still remain. The institutions nearest to the people are local municipalities. To become responsive to public needs, the local government had to engage in rebuilding and transformation process. Like other local government structures, the Zululand District Municipality was entrusted with guaranteeing that the delivery of quality water is enhanced

and individuals are put first. As indicated by Leduka (2009), towns and urban communities arrived at the conclusion that they required delegates who ought to oversee their undertakings to the benefit of everyone. In time, structures emerged that brought about local governments and lastly municipalities.

Thabethe (2011:49) further depicts government as the institution itself, while governance is a more extensive idea portraying types of governing which are not really in the hands of the formal government. The government is the subset that acts with authority and makes formal commitments. Thabethe thus asserts that governance requires not necessarily to be led only by governments. Private firms, associations of firms, NGOs and association of NGOs all take part in governance. As indicated by the Constitution of the Republic of South Africa of 1996 and the Local Government: Municipal Structures Act 1998 (Act 117 of 1998), another local government structure was brought in consisting of three arrangements of districts which are outlined below:

Classification A: Metropolitan municipalities with exclusive municipal executive and legislative authority in the area. Metropolitan areas can also be referred to as metros.

Classification B: Local municipalities which share municipal executive and legislative authority in their areas with Classification C municipalities.

Classification C: These are district municipalities which have municipal executive and legislative authority in an area that includes more than one local municipality for which the district council is accountable (Van Der Waldt, 2007: 50). The Zululand district municipality falls in this category.

Municipalities are relied upon to deliver on their mandate regardless of the considerable number of difficulties confronting local governments. It is for this reason that Chetty (2015) contends that municipalities have the obligation to ensure that all citizens are provided with services that fulfil their essential needs. This goes for both urban and rural communities alike.

2.7.2 Legislation Governing Water Provision in South Africa

There are basically three legislations governing the provision of water in South Africa namely, the Constitution of the Republic of South Africa, 1996, the Water Services Act, 108 of 1997 and the White Paper on Water Supply and Sanitation Policy, 1994.

The first legislation is the Constitution of the Republic of South Africa. Chapter two of the Constitution of South Africa of 1996 includes the bill of rights which is the foundation of democracy in South Africa. Section 7(2) of this Constitution states unequivocally that the state must respect, promote and fulfil the rights of individuals as recorded in the bill of rights. The right to fairness is additionally revered in this constitution. As indicated by section 9(1), (2), (3), (4) of this Constitution, no individual may be unfairly discriminated against on the grounds of; for instance, sexual orientation, sex, ethnic group or social origin, language and everyone is equal before the law. Section 10 provides for the right to human dignity. The right to health care, food, water and social security is additionally protected by this constitution. Section 27(1) (b) unequivocally expresses that everyone has the right to access to adequate food and water. Subsection two of this section states categorically clear that the state has full duty to see to it that these rights are acknowledged progressively.

Section 74 (2) (c) of the Municipal Systems Act, 32 of 2000, as amended, expects the municipality to give fundamental services through an assortment of steps. The tariffs, for instance, cover only operating and maintenance costs and subsidizing the poor households. A follow-up to the above section is the Free Basic Water Policy (FWBP) which was presented in South Africa by the year 2000. Regarding the Free Basic Water Policy, the families are entitled to six thousand litres of water every month and this amount to twenty-five litres for each individual every day for a family of eight (Machethe, 2011). Although this arrangement targeted the poor people, it is difficult for the government to control this approach since even individuals who did not qualify needed to benefit. Municipalities control this arrangement by having poverty stricken policy set up for individuals who meet all the requirements to fulfil the important form with the goal for them to get a rebate.

The second legislation governing water is the Water Services Act (WSA) 108, of 1997. The Water Services Act 108, of 1997 provides for the rights of access to basic water and sanitation. The establishment of water boards and water services committees is likewise provided for in this Act. The rights to access to basic water supply and basic sanitation that will ensure that the living condition is not harmful to society is figured out. Regarding section 3(1) of the Water Services Act, 1997, everyone has the right of access to basic water supply and sanitation. Subsections 2, 3 of this section provide that every water services establishment must take

sensible measures to understand these rights. Each water authority should in its water services development plan, accommodate measures to understand this right. The provision of water must be reasonable and equitable to the individuals of the public.

Section 4 (1) (2) of the Water Services Act 108, of 1997, provides that water services must be provided in accordance with the terms and conditions set by the water services provider. These conditions must be open to the public. Subsection (2) (C) provides for the conditions for payment, tariffs and the conditions under which water services might be constrained or discontinued and must be made open to the public. The water boards and the water services authorities and in addition their jurisdiction are all around clarified in the above Act. The Water Services Act 108, of 1997 states that "each water service authority has an obligation to all consumers" to provide water which is free from contamination. These water services authorities incorporate the national, provincial and the local government. However, as per the Water Services Act, 108 of 1997, the onus is with the local government to provide water to the communities within its jurisdiction (Machethe, 2011:14).

The third legislation governing water is the White Paper on Water Supply and Sanitation Policy. This White Paper was presented by the Minister of Water Affairs and Forestry in the Republic of South Africa. This White Paper was introduced due to the fact that water and sanitation were vital to the RDP procedure. It was found that more than 12 million individuals did not have access to basic water and sanitation. On July 1, 1994, another department came into existence. This new department was called; the Department of Water Affairs and Forestry. Prior to the introduction of this department, South Africa was partitioned into eleven distinct homelands, six self-governing territories and the prevailing RSA territory, administered by the tri-cameral parliament. The issue of water supply was supposed to be addressed immediately after the issues of jobs and housing respectively.

The Republic of South Africa sadly did not have equity in water supply and this prompted the introduction of the White Paper on Water Supply and Sanitation. By the end of the nineteenth century, there was as yet a serious disparity of water supply in South Africa. Piped water distribution, for instance, was in the vicinity of 95.4 and 100% for the Indians, whites and coloured. Just 43.3% of the black community got piped water to their homes. Most of the water in South Africa amid this period was for white commercial agribusiness,

notwithstanding, the fact that section C of the Water and Sanitation Policy demonstrates that basic services including the provision of water are a human right. As provided for in the Constitution of South Africa, 1996 all the citizens of the country irrespective of colour are equal before the law. Because of the above fact everyone is entitled to free basic water supply (White Paper on Water Supply and Sanitation Policy, 1994:3, 4).

Basic water provision in accordance with the government's Reconstruction and Development Program was to cover each citizen regardless of colour. In terms of the White Paper on Water Supply and Sanitation Policy (1994:14, 15) free basic water supply is set at 25 litres for each individual every day. This is reckoned to be the minimum required not only for direct utilisation and for the arrangement of food but also for individual hygiene. The cartage ought to be the minimum of 200m and the distance might be decreased in a steep territory. The accessibility of water from the outlet ought not to be less than 10 litres per minute. The user of the water services must pay for this service.

The South African government likewise attempted to subsidize the poor communities who were not able to pay for themselves. The disarray that may emerge from the information about water subsidies by the government might be that even individuals who do not meet all the requirements for these subsidies may stop paying. These may become a burden to the department. This white paper likewise provides the role of water boards as acting in the capacity of operators of DWAF at the regional level. The functions entrusted to the water boards are the improvement of water supply and sanitation services at the regional level. The local water councils are supporting the local democracy (The White Paper On Water Supply and Sanitation Policy, 1994:24).

The function of the national government is to guarantee that what occurs at the grassroots level meets the standard. In short, the function of the central government is to monitor, execute, audit and regulate the functions. Another key function that is accommodated in this white paper is the involvement of women in all statutory bodies such as the water sector and the local water committees. It is in this white paper that the management of drought and different disasters are highlighted. The water system board is additionally regulated in the white paper. This is because of the way the early history of water advancement in South

Africa was centred on water system and huge public resources were allocated to the improvement of water resources for the proprietors of suitable agricultural land. These proprietors of land constituted a very small proportion of the population (The White Paper on Water Supply and Sanitation Policy, 1994:9, 10).

In conclusion, this White Paper encourages advancement that is demand-driven and community-based. When it comes to water supply and sanitation, the role of the central government is to deal with the country's water resources, to guarantee that every citizen has access to essential services including water. Monitoring and auditing within the jurisdiction of the national government is of great importance. The provincial government creates local government and this government does the execution. The water boards may likewise give benefits directly to the consumers without the local government. To accomplish the objectives of this white paper, a joint venture of government, the private sector, NGOs and the communities is necessary (The White Paper on Water Supply and Sanitation Policy, 1994:10).

2.8 State of Water Scarcity

In South Africa, water, like everywhere else on the planet, is becoming a scarce resource and an essential one especially on the grounds that both individuals and business enterprises require water and electricity for their survival. Notably, regularly moving water over long distances from dams or rivers to manage businesses and individuals living in towns and urban communities is not a simple task because the dams are not strategically placed (Stone 2009: 46). At the same moment, Van Vuuren (2009:31) takes a gander at the momentum situation and gives a few recommendations on what the business community and industry can collectively do to reduce the issue of water shortage. Water issues in South Africa entail the diminishing quality of water, water shortage and dysfunctional municipal water infrastructures that have brought about the potential water crisis widely broadcasted in the media.

The cause of the scarcity of water in each and every region varies. In other regions the reasons are natural, while in other areas they are human made. Research conducted in the field of water management has established that the causes are both human and natural. This section, therefore, probes into both the natural and human made causes of overall scarcity of water.

2.8.1 Natural Causes

The following are in terms of literature reviewed the natural causes of the scarcity of water in most areas namely, climate change, earth quake, drought, surface runoff, as well as evaporation and transpiration. The first natural cause is climate change. As indicated by Oduniyi (2014:36), environmental change is the reason for the change in the distribution of the world's water. This conclusion is drawn from the fact that water accessibility is additionally reliant on climatic conditions. The shortage of water for household utilisation is arguably linked to low flow periods during summer. High temperatures during this period call for more water for agricultural purposes.

It is perceptible that the shortage of water is connected to the rising heat or hot temperatures. The above discoveries derive from a project on assessment of the effect of environmental change on the river flow conditions. Arguably, common knowledge bolsters the above information as many people are likely to realize that the water sources become scarce after a prolonged period of less or no precipitation combined with a lot of heat. Water shortage for household utilisation will clearly lack unless there are different intercessions. Similarly, Eriksen, O'brien and Rosentrater (2008:7) assert that the increasing droughts in Southern African dry land will additionally increase due to high temperatures and reduced rainfall. According to Van Rooyen, Van Niekerk and Versfeld (2009:7), the development of water resources need to be done taking into consideration many elements which include, among other things, rainfall and run off. It is notable, therefore, that climate change adds to the uncertainties of the supply of water.

The second natural cause is the earthquake**.** As a matter of fact, earthquakes do cause water shortage in that they destroy the assortment of infrastructures including those of the supply of water. The water service may be demolished for days, weeks, months or even for longer periods depending on the extent of the damage (D'Amico, 2015:650). The third natural cause of the scarcity of water is drought**.**

Drought can be characterized as a prolonged period of abnormal dry climate in a territory; low precipitation prompts low water in aquifers and the pattern may prompt water shortages for even the households. Southeast England, for instance, experienced shortages of water since 2004. The water levels in a few catchments drop because of precipitation that is beneath

normal (Fabriz, 2009:6). A balance must be maintained between the water provided and the surface run off to supplant it. At the point when there is a dry winter expected, an excess of water does not occur and results with reservoirs not adequately filled towards the start of summer. Water shortage comes about these conditions notwithstanding when summer is not excessively dry (Schyns, Hamaideh, Hoekstra and Moekannen, 2015).

Surface Runoff is the fifth natural cause of the scarcity of water. DeNicola (2015) hypothesizes that surface runoff is likewise a cause for drinkable water shortage. This is because of the way a flood carries distinctive objects starting from the ground into drinkable water sources. The rivers, wellsprings and dams that ordinarily provide water to the households might be rendered undrinkable during heavy floods extending for some days or weeks after the flood. On occasion, a river which might be a sole source of clean water for the community may likewise turn into a source of flood. This may create a circumstance whereby the community is left without water for household utilisation (Uitto and Biswas, 2000:205).

Similarly, Twort, Ratnayaka and Brandt (2008:84) argue that the peak runoffs are hard to appraise because of the harm occasioned by the wreckage and residue brought down by the floods. These objects render the water unusable for some family unit activities including drinking. Runoff is, as indicated by Nicole (2015:72), a noteworthy loss of water. At the point when precipitation is high and infiltration rate is low as a result of steep slopes, runoff turns out to be high and a high amount of water is lost.

The next cause is evaporation and transpiration. Evaporation is the key part of the hydrological cycle as seventy-five percent of the yearly precipitation comes back to the environment because of evaporation and transpiration (Trenberth, 2011:135). As asserted by Trenberth a lot of water goes back to the atmosphere because of ‘evapotranspiration’ which is a mix of the two procedures, to be specific, evaporation and transpiration. It is hard to gauge the loss of water through these procedures with certainty. Through these procedures, water is lost from any open water source, for example, dams, reservoirs, rivers and the vegetation (Twort, Ratnayaka and Brandt 2000:73).

2.8.2 Human causes

According to the literature reviewed, the following human causes of the scarcity of water are discussed namely, disparity in water supply, illegal tap connections, urbanization and population growth, contamination of existing water sources and leaking pipes.

Disparity in the supply of water is the first human cause of the scarcity of water. Research conducted by Mainganye (2006) established that there is a divergence in the way the towns receive water. Furthermore, the investigation of the scarcity of specifically probing into the areas surrounding Zululand indicated high possibilities that water supply in specific areas may be interrupted. The disparity of the supply of water in the region is, arguably, caused by the absence of commitment from the government authorities in the Municipality. It is also notable that water shortage is a result of unequal distribution among the residents (The White Paper on Water Supply and Sanitation Policy, 1994:3). The introduction of the white paper on water provision was prompted by the unequal sharing of this resource. For instance, South Africa experienced incongruities in water dispersion towards the end of the nineteenth century. As it was then, the whites, Indians, and the coloreds were privileged to receive between 95 and 100% of piped water to their homes. On the contrary, 57.7% of the black group did not have piped water to their homes on the other (The White Paper on Water Supply and Sanitation Policy 1994: 3).

The next human cause is illegal tap connections. Research conducted by Sebola (2000) in his masters' dissertation titled, "The water supply schemes, scarcity and development projects: A case of Taaibosch-groet, Northern Province" established that illegal tap connections also contribute to the scarcity of water. The Taaibosch-groet community had a gardening project and a brick making project. The two projects obviously needed water in order for them to be ecological. However, due to illegal connections the two projects which provided food and employment for the Taaibosch-groet community collapsed. Illegal water connections had dangerous consequences to this community.

Urbanization and population growth is another human cause. Despite the fact that few causes accounting for the shortage of water are natural. Other causes, however, are human. Our physical environment can be changed by human behavior such that valuable water becomes scarce. It needs to be underlined, therefore that the shortage of water can be caused by human

behavior, for instance, the measure of water that is regarded enough at present can be scare at some time in the future because of developments in the population and household incomes (Machethe, 2011: 22). Similarly, the UN general secretary Ban Ki-moon, in his speech on world water day 22 March 2007 stated that “the condition of the world waters stays delicate”. Mr Ban Ki-moon is additionally on record as saying: "accessible supplies are under great coercion because of high population growth (Jolly, 2016). Contamination of existing water sources is the next human cause of the scarcity of water. Normal water supplies can be polluted by an assortment of sources, for instance, industrial effluent; agrochemical run-off fields; the casual disposal of human excreta and also poorly treated sewage from municipal works. All these may come about with lacking safe/clean water for household utilisation (Spellman, 2014:203).

Similarly, Cavin, Levin and Sunna (2013) aver that “unsanitary conditions will increase the risk of fly-borne illnesses”. For instance, enteritis and cholera are typical representative examples in this regard. The outbreak of cholera that occurred in East Africa and Mozambique underscore the requirement for satisfactory sanitation. Pollution is one of the reasons for water shortage. As indicated by Giupponi, Jakeman, Kassenbeg and Hare (2006:31), the utilisation of agricultural fertilizers and pesticides brings about water pollution. This is an issue in both developed and developing countries like South Africa. Leaking water pipes is also a human cause of the scarcity of water. Water is frequently moved through pipes for longer distances. This is because dams are not generally located. In these occurrences, pipes may begin leaking because of the duration and this will result in insufficient water reaching the desired destination. This circumstance calls for methodologies to identify leakages or conduct objective assessments with regard to whether or not there is a need for the replacement of the leaking pipes (Cavin, Levin and Sunna, 2013). The discussion above indicates that leakages in general are avenues to be visited by the researcher when trying to establish answers to the problem under investigation which in this study is the shortage of water in the Zululand region.

In an article provided by Nhlapo (2016), Municipal officials in Zululand assert that the crisis of water as it obtains now is an unprecedented occurrence. According to the Zululand District Municipal Manager, all the rivers have dried up, and they are currently drilling boreholes to

provide some relief. The municipal manager also remarked that having limited resources to deal with the worsening situation has made things even more difficult. Dam levels are still making the Department of Water and Sanitation (DWS) and local municipalities sweat, as they work to lower the use of water by putting measures in place to prevent recurring wastage of water across northern KZN (Moorcroft, 2016).

The water situation is not only faced in KwaZulu-Natal. The Western Cape Province has been confronted by water crisis, especially in Cape Town where is getting worse every day. Cape Town has tightened its water usage restrictions by banning the use of potable water to irrigate gardens, wash cars or top up swimming pools, as it confronts its worst drought on record. The level of usable water in dams that supply South Africa's second-largest city and top tourist attraction dipped below 10 percent down from 20 percent a year ago. While Capetonians cut average daily summer consumption to 666 million liters (176 million gallons), from 1.1 billion liters a year ago, that is still far less in comparison to the city's 600-million-liter target (Cohen, 2017).

The above literature on different causes of the shortage of water is pivotal to this study. Although the above information contains evidence of many causes as to why there is inadequate water supply, this study follows up water supply risks faced within the system. It is evident that water supply risks are faced everywhere in the country with the increasing demand.

2.9 Conclusion

This chapter firstly defined supply chain management in the aspect that is required of the study and illustrated how SCRM can be used as a tool to manage risks in water supply. Furthermore, the Force Field Analysis illustrated how water supply risks can be established for change management to occur. This chapter also showed that water is becoming scarce in South Africa and the world at large. Both natural and human causes of the scarcity of water were discussed based on a variety of sources. In the chapter that follows, the study will look at the research methodology and design. The purpose of the chapter is to justify the purpose of selecting particular research methodology, their designs, sampling and how ethical consideration of the research was ensured.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

The research methodology describes the procedures, techniques and methods that are utilised in the process of implementing the research design and research plan (Streubert and Carpenter, 2011). Similarly, Leedy and Ormrod (2005:2) assert that "research is the systematic process of collecting, analyzing and interpreting information (data) in order to increase one's understanding of the phenomenon with which one is interested or apprehensive to".

In this chapter, the research methodology used to accomplish the objectives of this study is discussed. It is notable that when one embarks on a research project, "the methodology one chooses to use is very important in determining both the form as well as the success of the whole research project" (Megan, 2005:2). The methodology use for this research has been carefully chosen in order to achieve credibility and ensure that any unexpected theme is given the opportunity to emerge. Pamela and Susan (2008:544) are of view that the methodology employed in a study should ensure that "the research is not explored through one lens, but rather a variety of lenses which allow for multiple facets of the research to be revealed and understood".

This section, therefore, demonstrates the planning and organization that took place to arrive at the end goal of answering the research questions. Thus, tools and methods of collecting, verifying and interpreting the data are discussed herein. In a nutshell, therefore, this chapter presents the research design and methodology which were followed to collect data for this study. The study followed a qualitative research design. In discussing this chapter, the following items namely, research design and research methodology are discussed.

3.2 Research Design

Chapter one introduced the research methodology briefly. In this chapter, a more detailed discussion is presented. Research design harmonizes the activities of a research, and it promotes the efficient and effective functioning of the methodology applied in a research. It provides a systematic flow that supports the construction, reconstruction and deconstruction of the context under investigation (Parker, 2011).

According to Ragin (1994), it is a plan for collecting and analysing evidence that makes it possible for the investigator in a research to answer whatever questions he/she has posed. A properly designed research supports the development of information for linking components within the research. It also supports the development of theories that become a criterion in gaining a sharpened understanding of a phenomenon and for interpreting the research findings. Research design is a plan or a blueprint used when one intends to conduct research (Babbie and Mouton, 2001:55). It is characterized as the overall strategy on how the researcher plans to carry out the study in order to solve the research problem (Mbhele, 2014). In other words, the research design reveals the type of data that is going to be used, the methods that are going to be used to collect and analyse data (Van Wyk, 2012). Additionally, research design can be viewed as the plan that is utilised by investigators in an attempt to address the research questions and further gives an understanding on how the study is to be conducted (Thomas, 2010).

For the purpose of this study, the researcher used a case study, involving interviews to gain insight on the experiences of the participants in order to arrive at a sound conclusion. The nature and complexity of the research problem, research questions and related research aims called for a purposeful research design to meet the requirements of these research intentions. For this reason, qualitative research design was chosen to increase the scope and range of the research in order to address the research problem.

3.3 Type of design

Wachauf-Tautermann and Weichert (2015) point out that the research design is divided into three main classes available to researchers that may be used for data collection and analysis. The main classes are descriptive, explanatory, and exploratory, and are briefly discussed in the following sections;

3.3.1 Descriptive Research

According to Wyse (2011:110) descriptive research is characterized “as the research that aims neither to describe a type of subject or a behavior but not look for any specific relationship nor to correlate two or more variables”. This study was mostly conducted in order to learn more about a specific problem and also to give an account of the characteristics that are involved.

They are typically structured and usually have a set of stated hypothesis or investigative questions (Cooper and Schindler, 1998:147). It involves collecting data that is quantitative in nature as it usually studies production figures or sales figures (Sekaran and Bougie, 2013). Aylward (2015:27) state that descriptive studies have the aim of accurately describing the phenomenon through the use of various data collection tools.

3.3.2 Explanatory Research

Explanatory research tries to explain the cause and effect relationships between variables. The significance on this type of research design is that investigators tries to study a problem, so as to clarify how and why there is a relationship between variables (Vosloo, 2014). In other words, it determines the link between variables that relate to research problem. These studies are conducted on the premise that a change in one variable results in a change in another variable.

3.3.3 Exploratory Study

Exploratory research is usually carried out when not much information is known about the subject being studied. This implies that there would be a limited number of similar problems or situations that would have been solved in the past by other researchers (Sekaran, 2003:119). An exploratory study aims at gaining insight into a situation or phenomenon, discover new ideas and enhance knowledge of the phenomenon (De Vos, Strydom, Fouche and Delport, 2011:295). Such studies are often carried out in instances when the researcher needs to understand a specific problem or situation. These studies are also considered by researchers when some facts are known regarding a subject but there is a need for more information to be discovered in order to aid with the development of a relevant framework.

As indicated by Sekaran and Bougie (2013), exploratory studies are also necessary when a few realities are known, but more knowledge is required about a phenomenon or a problem and how comparative issues have been settled previously. There are main courses in which the exploratory study can be directed on, like using secondary data (using past writing), and by interviewing experts in the subject and leading concentration assemble interviews (by means of qualitative method) to obtain primary data (Saunders *et al*., 2012).

An exploratory study in nature has been adopted for this research. Cooper and Schindler (2008:143) describe exploratory studies as “loose structures with the objective of discovering

future research tasks." The immediate purpose of exploration is usually to develop hypotheses or questions for further research. In order to accomplish the objectives of this research study, the exploratory study was used because it gives the nature of our research study through the use of literature and interviews. Since this study was exploratory in nature; a contextual analysis approach was adopted. An exploratory research study alludes to the research that mainly intends to gain knowledge and becoming familiar with a particular circumstance (Bernard and Ryan, 2010). In this study, the exploratory research helped in recognizing supply risks related to the balance between supply and demand of water in the Zululand region. This research design provided a perspective of the Zululand District Municipality and also an outline of the scope and idea of Supply Chain Management, Supply Chain Risk Management, and in addition, the distinctive types of risks confronted during the supply of water. The advantages that are associated with the use of case studies include the fact that the findings can be generalized to other organizations involved in the similar line of business.

3.4 Nature of the study

Qualitative research refers "to inductive, holistic, emic, subjective and process- oriented methods used to understand, interpret, describe and develop a theory on a phenomena or setting" **(**Mafuwane, 2012). It is a systematic, subjective approach used to describe life experiences and give them meaning (Burns and Grove, 2003:356). Qualitative research is mostly associated with words, language and experiences rather than measurements, statistics and numerical figures.

Researchers who use qualitative research adapt a person-centred and holistic perspective to understand the human experience, without focusing on specific concepts. The original context of the experience is unique, and rich knowledge and insight can be generated in depth to present a lively picture of the participants' reality and social context. These events and circumstances are important to the researcher (Holloway, 2005:4). Regarding the generation of knowledge, qualitative research is characterised as developmental and dynamic, and does not use formal structured instruments (Holloway, 2005:4). It involves the systematic collection and analysis of subjective narrative data in an organised and intuitive fashion to identify the characteristics and the significance of human experience (Holloway, 2005:47).

The table 3.1 below is a simple illustration of distinctive differences between qualitative and quantitative research.

Table 3.1: Comparison between qualitative and quantitative research

Basis for Comparison	Qualitative Research	Quantitative Research
Meaning	Qualitative research is a method of inquiry that develops understanding on human and social sciences, to find the way people think and feel.	Quantitative research is a research method that is used to generate numerical data and hard facts, by employing statistical, logical and mathematical technique.
Nature	Holistic	Particularistic
Approach	Subjective	Objective
Research type	Exploratory	Conclusive
Reasoning	Inductive	Deductive
Sampling	Purposive	Random
Data	Verbal	Measurable
Inquiry	Process-oriented	Result-oriented
Hypothesis	Generated	Tested
Elements of analysis	Words, pictures and objects	Numerical data
Objective	To explore and discover ideas used in the ongoing processes	To examine cause and effect relationship between variables
Methods	Non-structured techniques like in-depth interviews, group discussions etc	Structured techniques such as surveys, questionnaires and observations
Result	Develops initial understanding	Recommends final course of action

Source:Surbhi (2016)

This study followed a qualitative research design. The qualitative approach was used for the purpose of gathering qualitative data from the key informants with regard to water supply in the Zululand District Municipality.

3.5 Sampling design

Sampling design is defined as "the method of selecting the number of units for a study in a way that represents the larger population from which they are selected" (Sekaran and Bougie, 2010:266). There are two main kinds of sampling design: probability and non-probability sampling. A non-probability sampling design has been used in this research. This method of sampling does not confidently enable simplification across the population, however, the nature of this study is exploratory; non-probability sampling was a preferred method to provide insight on the subject of water supply risks in the Zululand region.

3.6 Target population

Bless, Higson-Smith and Kagee (2006:98) define population as the "entire set of objects or people, which is the focus of the research and about which the researcher wants to determine some characteristics". Buthelezi (2017:55) defines the target population as the "total elements in the target group or population that is relevant to the research study" whereas Sekaran (2008:271) defines a target population as "the whole total of respondents that meet the composed arrangement of criteria". This study utilised an example of the target population as opposed to the census which includes every one of the components in the population. In the present study, the target population included the Zululand District Municipality as this is the municipality that deals directly with water supply of the surrounding local municipalities.

The population for this study comprised of specific officials in the municipality. These officials (municipal managers' office, corporate services, planning and economic development, technical services and infrastructure, community services and lastly finance) were from different departments within the municipality that have different expertise in the contribution of water supply. These purposively chosen officials were the people with first-hand information with regard to the water supply as well as an idea of the topic and in addition, their insights on service delivery and supply chain management in the Zululand region. They were the key informants who could provide answers to the research questions as well as meet the research objectives.

3.7 Type of sample and sample size

A sample is "a small portion of the total set of objects, events or persons that together comprises the subject for the study" (De Vos, Fouche, and Delport, 2002:1999). Fox and Bayat (2007:59) indicate that, although units of analysis of non-probability sampling do not have an equal chance of being included in the sample, it still is frequently used because of its convenience. Greenfield (2002:189) defines purposive sampling as the technique where subjective judgments are used to resolutely select groups that the researcher believes will represent the population.

For the purpose of the study, nine officials in different departments from the Zululand District Municipality were chosen. These officials comprised the following: Municipal Managers office; corporate services; planning and economic development; technical services and infrastructure; community services and lastly finance. The municipal managers were selected to participate in this study because they are the accounting officer and they are responsible for everything that happens in the municipality including service delivery, administration, supply chain management and human resource. An official in the corporate services department was selected because this department is the support division and supports councilors and committees by providing effective and efficient services that match the world class standards.

One official was selected of the planning and economic development department because of this individual's responsibility of the execution of the integrated development plan, water services authority which includes water services development planning, water services regulations, tariffs and water services provider management. The technical services and infrastructure officials were chosen because they are responsible for the obstruction and the supply tool in the municipality. They provide cost effective, reliable water services of good quality to all potential consumers. The department is divided into three divisions which consist of project management, bulk water and wastewater management and lastly rural and urban reticulation.

The community services official was selected in this study to facilitate, where relevant, lead the implementation of local economic development through ensuring appropriate institutional capacity is created on the district level. This individual is solely responsible for educating community members about service delivery. Lastly, a finance department official was chosen

for this study because of the responsibility this individual poses in providing financial service for the municipality including performing budgeting, revenue collection, and accounting analysis. The department is also responsible for establishing and maintaining a system of internal controls designed to ensure that the assets of the municipality are protected from loss, theft and misuse.

For this research study, based on the information provided above, the participants were selected on the basis of them having to give a detailed description first on the supply operation of the provision of water in the Zululand District Municipality.

3.8 Data Collection

There are many tools that may be used to collect data; these tools include focus groups, interviews, questionnaires, observations, the internet, company records, archives, government publications, industry analysis, websites, as well as others (Sekaran and Bougie, 2013: 116). In carrying out a research study it is important to be able to put in place a reliable data collection process that will enable the researcher to be in possession of the data sets that can be useful in answering the research objectives and questions of the study. According to Pillay (2007: 197), data collection is a method of obtaining information from a group of respondents by means of direct contact, personal interviews or self-administered questionnaires. In this study both primary and secondary data sources have been used. Primary data is considered as the raw data that an organization or researcher collects for the rationale of achieving certain research objectives (Cooper and Schindler, 1998:55), while secondary data is the information gathered by another researcher or organization for the purposes of addressing a different research study other than the one being conducted (Kirby, 2001:43).

3.8.1 Interviews

In the qualitative research approach, interviews are conducted to involve some form of conversation with a purpose through engagement by the interviewer and interviewee around relevant issues, topics and experiences during the interview itself (Mason, 2002: 225). There are two main types of interviews that can be conducted by a researcher; namely structured and unstructured interviews (Sekaran and Bougie, 2013: 118). A structured interview is one that has been prepared in advance of the interview session. In a structured interview session, the respondent is asked a question and the researcher notes the answer and moves on the next

question, with no further follow-up or clarity seeking questions asked. The next participant is also asked the same questions in the same manner (Myers, 2009: 121).

The structured interview approach rather limits the researcher and leaves a very small room for flexibility during interviews. Conversely, an unstructured or semi-structured interview allows for flexibility as the researcher is free to direct the interview toward the problem area or an area of interest that has become apparent during the interview session (Myers, 2009: 121). Semi-structured interviews also allow the researcher to be able to probe certain questions to gain more clarity (Remenyi, Williams, Money and Swartz, 2005: 111).

3.8.2 In-depth semi-structured interviews

In-depth interviews are described as empirical in the sense that they involve gathering information on a particular topic, and can be classified as theoretical since they are also used in developing and testing theories (Cavana, Delahaye and Sekaran, 2001:138). They are useful in cases where large amounts of data are needed in answering the research objectives and questions. In-depth interviews are conducted on a one-one basis and allow an opportunity for the researcher to explore the perceptions and ideas of individuals regarding specific subjects (Silverman, 1998:137).

In-depth semi structured interviews were adopted to allow the participants to be flexible when responding to questions. According to Haron (2012), the in-depth interview method is the way of getting information personally from the interviewee. The interview guide was developed in a manner that allowed the researcher flexibilityinprobing areas of interest that arose during the interview (Sekaran and Bougie, 2010: 189). In-depth interviews are mostly used in qualitative research studies as the setting creates a comfortable environment for the interviewer and the participant whom then allows the researcher to dig deeper to obtain the information that is needed (Clifford and French, 2010:105). The researcher in this study conducted interviews face-to-face. There was definitely a need for fundamental questions pertaining the dimensions of supply risks in the supply of water in the Zululand region.

3.9 Data Analysis

Data analysis refers to the manner in which the researcher meaningfully arranges both primary and secondary data collected during the course of a research study (Bernard, 2010:123). Data

analysis is the process of testing and tracking the data in order to see what is emerging from it and identify areas that require follow-up to better understand the response from participants (Grbich, 2013). Ling and Ling (2016) further define data analysis as the "stage of constructive and interpretive research of consolidating, interpreting and theorizing the data while making sense of it in terms of the respondents' perceptions of a certain situation". Various research studies make use of different tools in analyzing their data and these include content analysis, thematic analysis coupled with other statistical tools of analysis. To meet the objectives of this study, thematic analysis was utilised as a tool in making sense of the data collected from the interviews. In understanding how this tool was used, the section to follow will give a detailed scrutiny.

According to Braun and Clarke (2013:4), a thematic analysis is popular method that is used by researchers, in order to focus on the data in various ways. It is an easily accessible, flexible, and increasingly common method of qualitative data analysis. Thematic analysis assists in the identification of themes and patterns within the data using various steps to be discussed hereafter (Ngwenya and Naude, 2016). It involves searching and identifying common threads that are recorded across an interview and the analysis provides an accurate account for multifaceted and sensitive phenomena (Turunen, 2014:399). This allows the researcher to have an understanding of the emerging findings, thereby influencing the direction of the research (Thorpe, 2013).

Organizing data in thematic analysis is achieved through identifying common themes and dividing the research information into chunks and units that can be easily and successfully analysed (Stirling, 2001:400). The data is analysed using six-phase thematic analysis approach by. This general thematic analysis approach facilitates the process of becoming familiar with the data, systematically identifying codes and theme, and then defining and naming the comma themes found across the entire data set (Braun and Clarke, 2006). Therefore, with regards to this study, the process involved the identification of themes and patterns through careful reading and re-reading of the data obtained from the Zululand District Municipality officials purposively chosen.

3.9.1 Six-phase thematic analysis approach

Corbin and Strauss (2014) are of view that the thematic analysis phases have many similarities with other phases of qualitative studies and they are not unambiguous to thematic analysis. The analysis is prepared in a recursive method and not a linear way. The codes are extracted and these codes are altered into themes. The researcher recurrently refers to the extracted codes and the total data set and validates them. The phases are as follows:

- Phase one – Familiarisation of data

When a researcher engages in analysis, they may have collected the data themselves, or it may have been given to them. If the researcher collected it through interactive means, they may come to the analysis with some prior knowledge of the data, and possibly some initial analytic interests or thought (Bruno and Clarke, 2013:16). It is vital for the researcher to immerse themselves in the data to the extent that they are familiar with the depth and breadth of the content. Immersion usually involves repeated reading of the data, and reading the data in an active way - searching for meanings, patterns and so on. It is ideal to read through the entire data set at least once before one begins coding, as the ideas, identification of possible patterns will be shaped in the process of reading through. It is important to be familiar with all aspects of the data. At this phase, one of the reasons why qualitative research tends to use far smaller samples than, for example, questionnaire data will become apparent – the reading and re-reading of data is time consuming (Nasrabadi, Mohammadpour, Abbasi and Javadi, 2012).

- Phase two- Generating initial codes

The researcher creates a preliminary list of ideas related to the data. It is important for the researcher to organize the data into significance groups and give the initial codes to the data (Braun and Clarke, 2013:26). The codes can be explicit or implicit meanings (semantic or latent) that are related to the most basic part of the data or raw information and can be evaluated in a meaningful way with regard to a phenomenon. The codes can be formed depending on the analysis type, that is, inductive or theoretical, or depending on the specific type of the question that is formed in the researchers' mind (Saldaña, 2015).

The themes are sought from the codes whenever the initial codes are formed. For this purpose, one should know the codes. A long list of different codes is formulated and can gradually bring similar codes under a set. A name is given to each set and written in a concise

explanation for that name separately (Braun and Clarke, 2006:77). The data is then organized into the code sets meaningfully. Some codes form themes, some others are subthemes and some are codes that do not belong to a theme yet and they are necessary to be written temporarily to later determining the themes they belong to; or it may be necessary to extract a theme from them. It is important to consider how different codes can be combined to form an overarching theme. At the same time, the researcher should think about the relationship between different codes, themes and theme levels. Using the designs in the form of a thematic map on paper, software and schematic diagrams is highly helpful (Clarke and Braun, 2013:120).

- Phase three- Searching for Themes

The themes are sought from the codes whenever the initial codes are formed. For this purpose, the researcher should know the codes. There is a long list of different codes that the researcher can gradually bring similar codes under a set. A name is given to each set and then written in a concise explanation for that name separately (Saldaña, 2015). Some codes form themes, some others are subthemes and some are codes that do not belong to a theme yet and they are necessary to be written temporarily to later determining the themes they belong to; or it may be necessary to extract a theme from them. One should consider how different codes can be combined to form an overarching theme but at the same time, the researcher should think about the relationship between different codes, themes and theme levels (Ghiyasvandian, 2014).

- Phase four – Reviewing Themes

This phase is done in two levels: in the first level, one should go back to the extracted codes of each theme and see whether these codes form a consistent pattern. If one does, he or she goes to the second phase in which a process similar to the one in the previous phase is done but the validity of themes regarding the whole data in the entire data set is considered. In this state the thematic map should be an accurate document for the data set as a whole. At the end of this phase one should have a good idea on what differentiates the themes, how they are matched and the whole story they tell about the data. Otherwise more refining and reviewing is needed (Rubin, 2011).

- Phase five – Defining and naming themes

Braun and Clark (2015:95) state that the researcher should initiate in defining themes in this phase and review and refine them while analyzing the data. In this phase, the researcher should deduct what the theme says and what it is about and what aspects of the data are covered by the theme. Here, in addition to interpretation of the data content, one should determine the things that are interesting regarding the data and the way they become important. In addition, during refinement the researcher should determine whether each theme has subtheme (s) or not. Subthemes are in fact themes inside themes and a set of subthemes make a complex and big theme and show the meaning hierarchy in the data. The researcher is then compelled to make a summary of the scope and contents of each theme in about two sentences and be clear and accurate in doing so.

- Phase six – Producing the report

The sixth phase begins when the researcher has a good set of themes and does the final analysis by writing and reporting them. It is important to note that the story of themes is expressed precisely, consistently, rationally, with no duplication and with attraction through or from within the themes. The provided essence should be identifiable easily (Braun and Clark, 2006:98).

In conclusion, the thematic analysis is the most common and the simplest form of analysis in qualitative research. It is an approach for extraction of meanings and concepts from data and includes pinpointing, examining, and recording patterns or themes. Thematic analysis does not only provide a flexible method of data analysis in qualitative research but it also establishes the more systematic and explicit form of it without threatening depth of analysis. Overall, considering the advantages and limitations of this method, the researcher decides whether to employ this method or not. It is why in this particular study, the researcher used this analysis.

3.9.2 Analysis of themes

The themes that were identified in this study after collecting the data are mutually exclusive and exhaustive in nature (Mbili, 2015:70). These themes were highlighted when the researcher was reading through the data. Each highlighted theme was given a theme code. The following are the steps that were taken in analysing the data that was collected (Cavana, Delahaye and Sekaran, 2001: 173).

The data was collected, recorded and later transcribed by the researcher. The data was then source coded in order to avoid any confusion at a later stage, and respondents were each given unique identifiers. The researcher then read through the transcribed data and listened again to the recordings to make sure that nothing was missed out and during the listening and reading the researcher then identified themes and categories that could be used to group the data. When the researcher had found what she thought was the next theme, she then compared it to the ones before in order to make sure that the themes were exhaustive and mutually exclusive.

Each passage from the data collected, along with the source code was then taken and put under a theme that the researcher associated it with. Any passage or text that could not be categorized with the initial coding scheme was given a new code. The researcher then studied the causes and consequences, interactions, strategies, conditions and concepts that cluster together and read through the theme files to look for sub-categories. In this stage the researcher identified rules for inclusion, which assisted in identifying the characteristics of the different passages of the raw data that served as basis for including or not including subsequent data. After the researcher had categorized the data and made sense of homogeneity and purity, the data was mapped in order to find out the relationship between the different phenomena. Having mapped the data and made better sense of relationships between the data that was categorized, the researcher was then able to write a report and to draw conclusions based on the themes discovered as well as the relationships that were established in the data collected.

3.10 Data Quality Control

Reliability focuses mainly on the credibility of the findings. Streubert, Speziale and Carpenter (2003: 364) describe trustworthiness as "establishing the validity and reliability of qualitative research". Qualitative research is trustworthy when it accurately represents the experiences of the study participants. Trustworthiness establishes the validity and reliability of qualitative research (Talbot 1995:428). The research demonstrates trustworthiness when the experiences of the participants were accurately represented (Nell, 2016). Trustworthiness of data is demonstrated through the researcher's attention to and confirmation of information discovery. This is referred to as rigour. The goal of rigour in qualitative research is to accurately represent the study participants' experiences (Vosloo, 2014). In a qualitative research study

this looks at the participants that have been interviewed and how likely they are to give the required information with low to zero levels of bias (Welman, Kruger and Mitchell, 2005: 145). It is therefore pivotal to validate the trustworthiness of the data looking at the components of credibility, confirmability and dependability of the research study.

3.11 Limitation of the study

Only one district municipality was included in this study. Other areas and district municipalities that are faced with a similar problem of water inefficiency would not partake in this study; therefore, the findings of this research cannot be generalized to all areas and district municipalities in South Africa. Data was collected using an interview guideline which was based on nine district municipality officials. The problem would arise if two out of nine officials are not present on the scheduled interview date and time provided. Interviews are time-consuming and labour intensive, as the study would take place during office hours within the municipality. Therefore, the researcher would have to take the constraint of time into consideration, in order to receive adequate information regarding the study.

3.12 Conclusion

This chapter has outlined the methodology that was utilised. The methodology has covered the research design, compared qualitative and quantitative research designs, target population looking at both the type of sample and sample size, data collection and measurement, data analysis, reliability and validity and delimitations of the study. The reason for selecting an exploratory research design was explained as well as how the use of semi-structured, in-depth interviews in the study provided the researcher the flexibility required to analyse certain parts additionally. Thematic analysis was chosen for this study as it aided the researcher to generate themes, to scrutinize the themes and to then map them to find out the relations that exist in the study. This chapter further delineated the different roles and responsibilities that each official performs in the different departments chosen to participate in the study. It transpired that each department played a significant role in the provision of water in the Zululand District Municipality.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION OF THEFINDINGS

4.1 Introduction

This study has been designed to answer specific research questions and achieve specific objectives. The topic of insufficient water supply has received much attention because of the impact it has on peoples' lives. The main aim in this study was to locate the dimension of supply risks in the supply of water in order to improve the supply chain operations of the municipality so that water in the Zululand region can be supplied with relative ease. Chapter one of this dissertation provided the background of the study and introduced both the research questions and the research objectives. The research objectives set out in chapter one is as follows:

(a) To establish the degree of balance between water supply and demand characterized by driving forces of service delivery.

(b) To determine the extent of supply risk management of water within the restraining forces of the Zululand District Municipality.

(c) To determine the magnitude response capacity of the Zululand District Municipality to mitigate the supply risk of water delivery.

(d) To analyse whether the integration of service delivery activities enhance the supply component of water.

The second chapter reviewed the literature which is pertinent to the issue of the scarcity of water which stems from both human and natural causes. The literature reviewed in this regard derived from a variety of sources focusing on the concept of supply chain management looking at the operations attribute in the public sector. Chapter three dealt with the outline of the research design and methodology that have been used in this study and the different tools used in collecting and analyzing the data collected in pursuance of achieving the objectives of the study.

This chapter, therefore, provides a detailed reflection and analysis of the data collected for the study. The chapter provides an in-depth analysis of the data, the level of participation of the

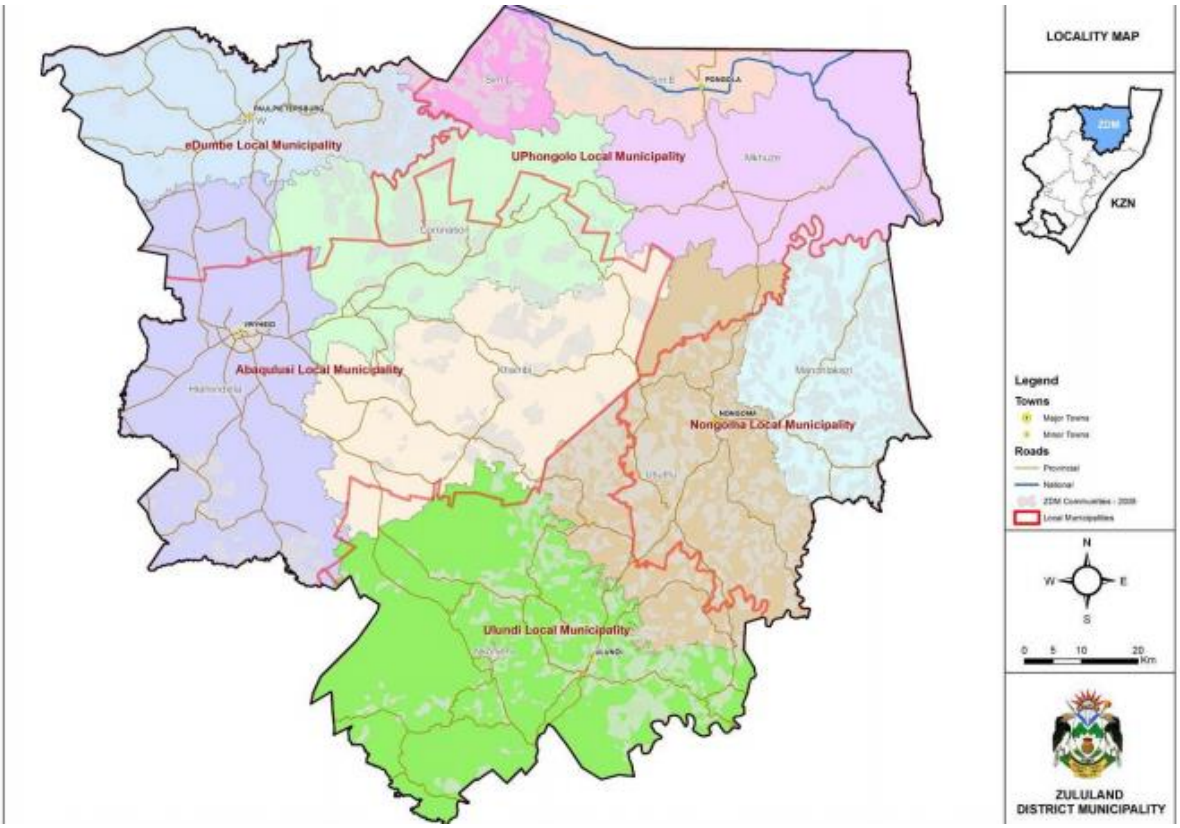
respondents and the relevance of the contributions that were made by the officials involved as respondents suing in-depth semi structured interview guide allowed flexibility for both the researcher and the respondents to add or elaborate on points made when answering the questions posed.

4.2 Overview of the water industry in the Zululand region

While the drought has left tremendous swathes of the country without water, a huge number of South Africans may endure additionally water cuts purely in light of the fact that their municipalities have neglected to pay their water bills. Water and sanitation minister, Mokonyane (2017), uncovered those municipalities owed R10.7bn for water supplies of which R3.9bn was owed to the Water Trading Entity (WTE) of the department and R6.8bn to various water boards. The Zululand District Municipality is among 30 municipalities distinguished that owe money for water supply. The Zululand District Municipality in Northern KZN is home to around 400000 occupants and five local municipalities owe R56m (Madisha, 2017). Mokonyane (2017) said that while the authorities did not have any desire to hurt water clients, sadly, steps need to be taken to recuperate the money. The Zululand District Municipality created an impression in regards to this issue on how they should meet with the department on the issue of its exceptional obligation. Mnyeni (2017) announced that while recognizing non-installment of crude water charges by DWS, the district municipality said it required some clearness on the measure of R56-million specified. It said additionally insights with respect to 'the said charges must be uncovered once the meeting between the two gatherings had been assembled'.

Zululand District Municipality (ZDM) is located in Northern KwaZulu-Natal (see Figure 4.1) which consists of AbaQulusi Local Municipality, eDumbe Local Municipality, Nongoma Local Municipality, uPhongolo Local Municipality and Ulundi Local Municipality. Notably, the Zululand District Municipality covers an area of 14,808 km2 including the five local municipalities mentioned above. The district is predominantly rural with commercial farmland interspersed with protected areas, towns and dense scattered rural settlements within areas of traditional authority (Capital Regional Infrastructure Investment Report, 2017). The following map shows the location of ZDM within KwaZulu-Natal as well as the five Local Municipalities within its area of jurisdiction.

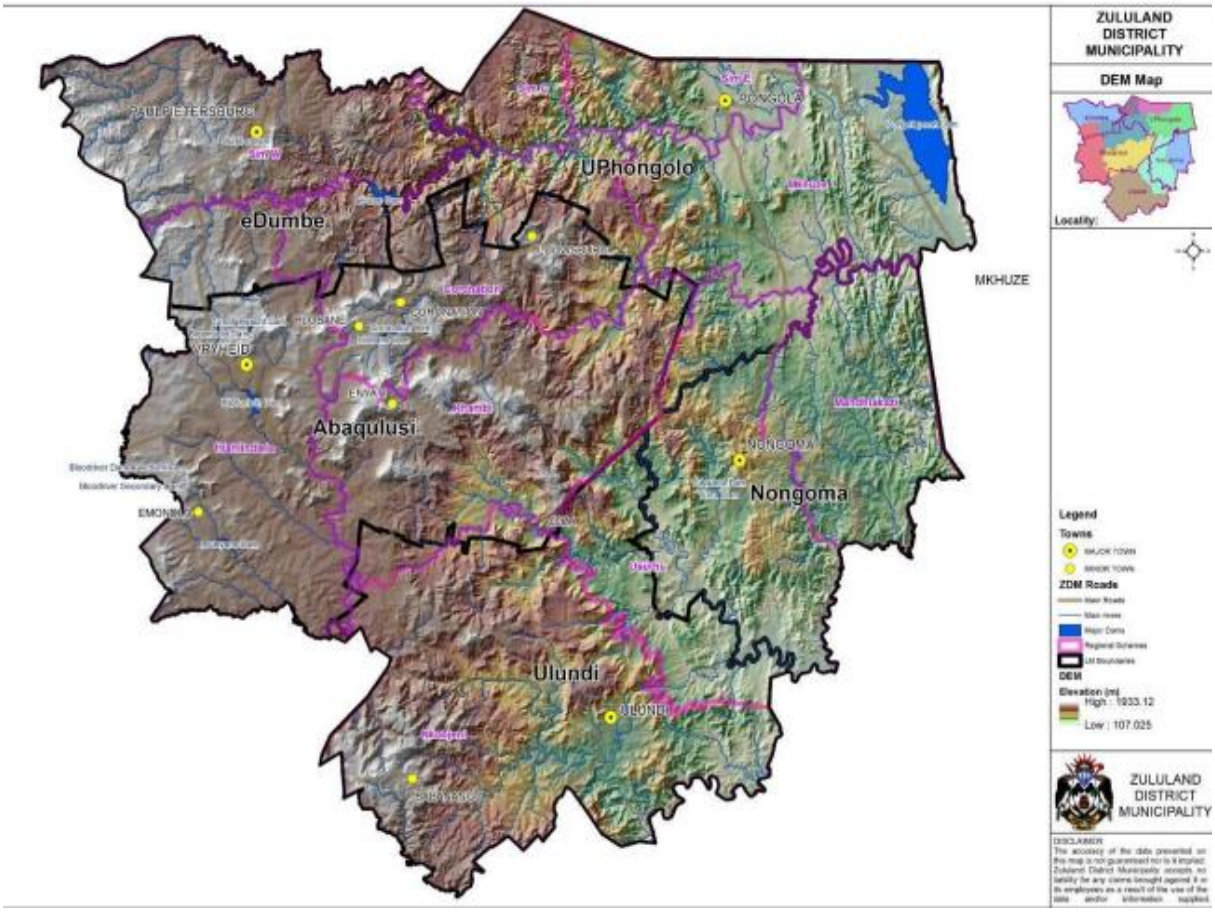
Figure 4.1: Zululand District Municipality Locality Map



Source: (Capital and Regional Investment report, 2017)

The greater part of the rural settlement is small and situated in mountainous areas, making service delivery to these remote areas extremely costly (see Figure 4.2). The ZDM comprises 1,122 settlements divided into 15 urban areas, 64 dense settlements, 290 villages, 547 scattered settlements and 106 farm settlements.

Figure 4.2: Zululand District Municipality Topography



Source: (Capital and Regional Investment Report, 2017)

Water Services Authority Legislative Requirements of the Zululand District Municipality as the Water Service Authority has a duty to all the customers or potential customers in its area of jurisdiction to progressively ensure efficient, affordable, economical and sustainable access to Water Services (Water Services Act of 1997, Section 11, 2017).

ZDM, therefore, has a legislative responsibility to prepare a Water Services Development Plan (WSDP) for its area of jurisdiction (Water Service Act of 1997, Section 12, 2017). The water services development plan describes in a systematic way how and by what means water will be supplied in a sustainable manner, to communities within the ZDM area of jurisdiction. One respondent during the interview stated that *"the biggest concentration of backlogs for water*

and sanitation services is located in the Ulundi and Nongoma Local Municipal areas. These municipalities consist mainly of traditional authority areas, and eradication of backlogs is costly due to the remoteness of areas, topography, poor road conditions, and poor quality and quantity of local water sources".

Furthermore, one also stated that *"the demand for water is huge vis-à-vis what we can do on the ground. One needs to be reminded that people in the rural areas are sparsely populated which means the cost per capital for supplying people with water is huge because the pipe must run a lot of metres before reaching a household".* Additionally, another respondent stated that *"If you drive along the road at Nongoma, specifically on the main road, in the afternoon, you will see people running for water tanks as soon as they see them. This shows that the demand for water is enormous".*

These statements made by these respondents of the district municipality are an indication that a backlog exists and it is important to identify the risks of water supply in order to mitigate further risks in future.

4.3 Biographical Information of respondents

The names of the respondents who participated in the study are confidential and this is in terms of the ethical clearance granted for this study. The researcher purposively chose officials from different departments in the municipality to participate in the study, including those that do not deal directly with the provision of water but with service delivery as a whole. The respondents in the study are referred as Resp 1, Resp 2 and so forth for convenience. In order to best describe the sample, respondents were asked questions related to their gender, age, home language, highest level of education, and years of active political participation. Their biographical information is presented below.

Table 4.1 Gender

Male	Female
5	**3**

Table 4.1 shows that a total of 8 participants were involved during this research study and within these 5 were male and 3 females.

Table 4.2 Age Group

Sample	1	2	3	4
Age	**15-25yrs**	**26-35yrs**	**36-45yrs**	**45+yrs**
Participants	**1**	**2**	**2**	**3**

The results as depicted on table 4.2 show that four sets of age groups took part in the study. In terms of the findings, there was only one respondent from fifteen to twenty-five years, only two were between twenty-six and thirty-five years. There were also two adults from thirty-six years to forty-five years. Three of the respondents were forty-five and above.

Figure 4.3 Description of Home Language

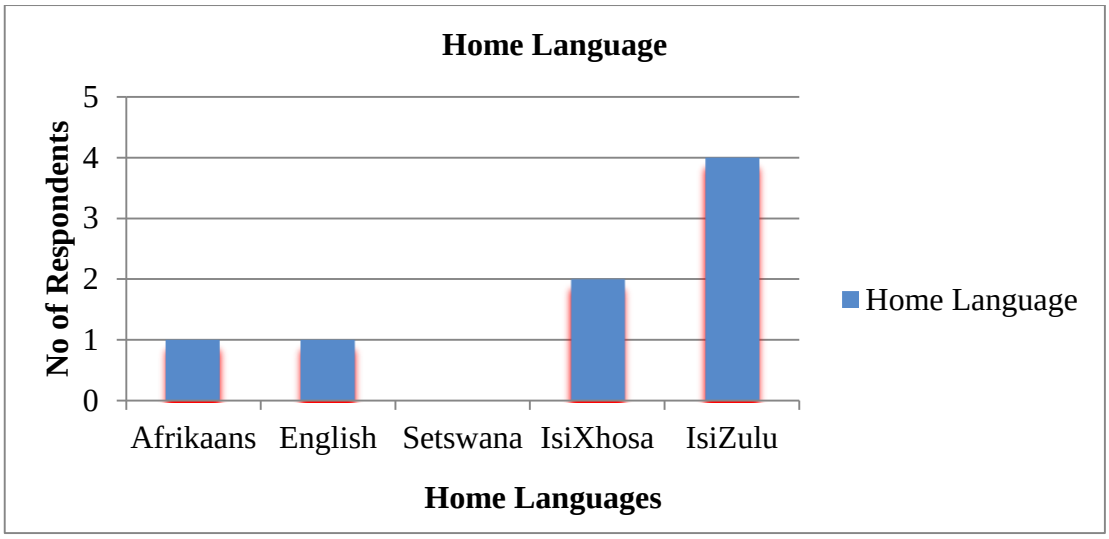


Figure 5.3 indicates that the majority of the respondents speak isiZulu as a home language (4). Zulu speaking people are considerably based in the Province of KwaZulu-Natal where most of the respondents came from. Two of the respondents speak isiXhosa and presumably moved to KwaZulu Natal because of their careers. One of the respondents speaks Afrikaans as a home language and there is one English speaking and none Setswana.

Figure 4.4 Educational Level

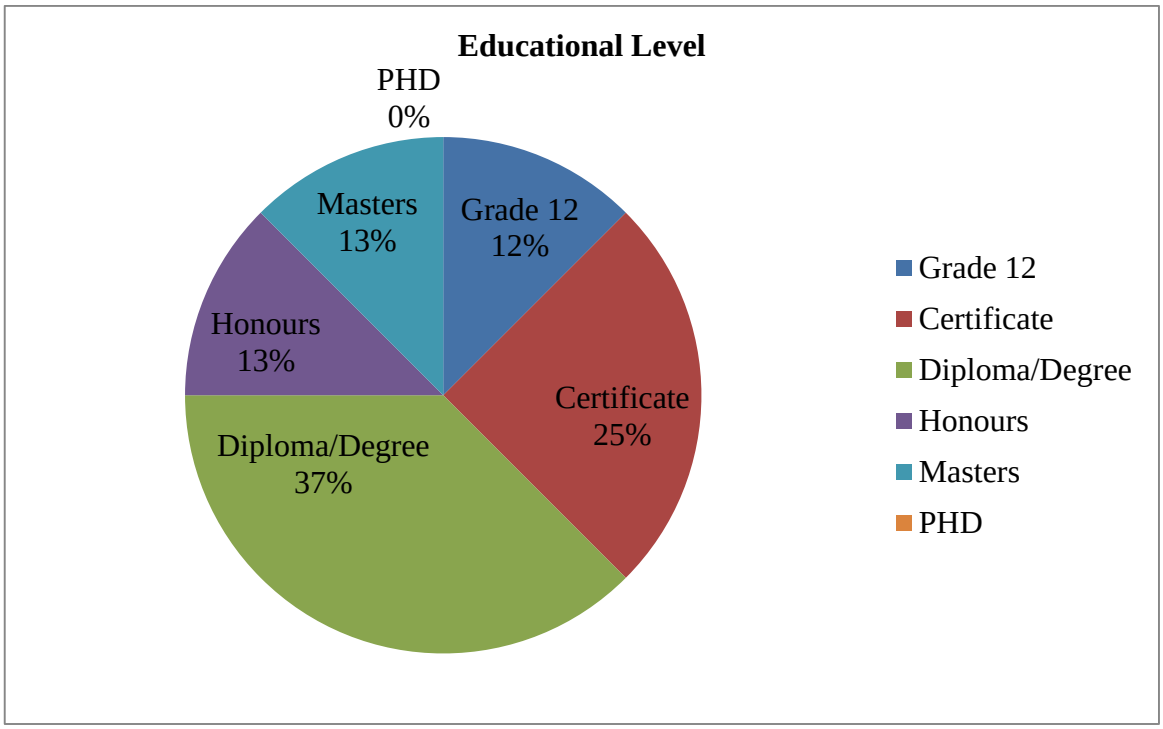


Figure 4.4 indicates that 37% of the respondents interviewed has degrees/diplomas as their highest level of education. Twenty-five percent of these respondents have certificates and 13 % with Masters. Additionally, 13 % of them also had honours and 12% have grade 12 as their highest level educational. None of the respondents have obtained their PHDs yet although some are working on it.

Table 4.3 Years Worked Category

1	2	3	4
0-2 yrs.	**3-6 yrs.**	**7-10 yrs.**	**10+ yrs.**
1	**1**	**4**	**2**

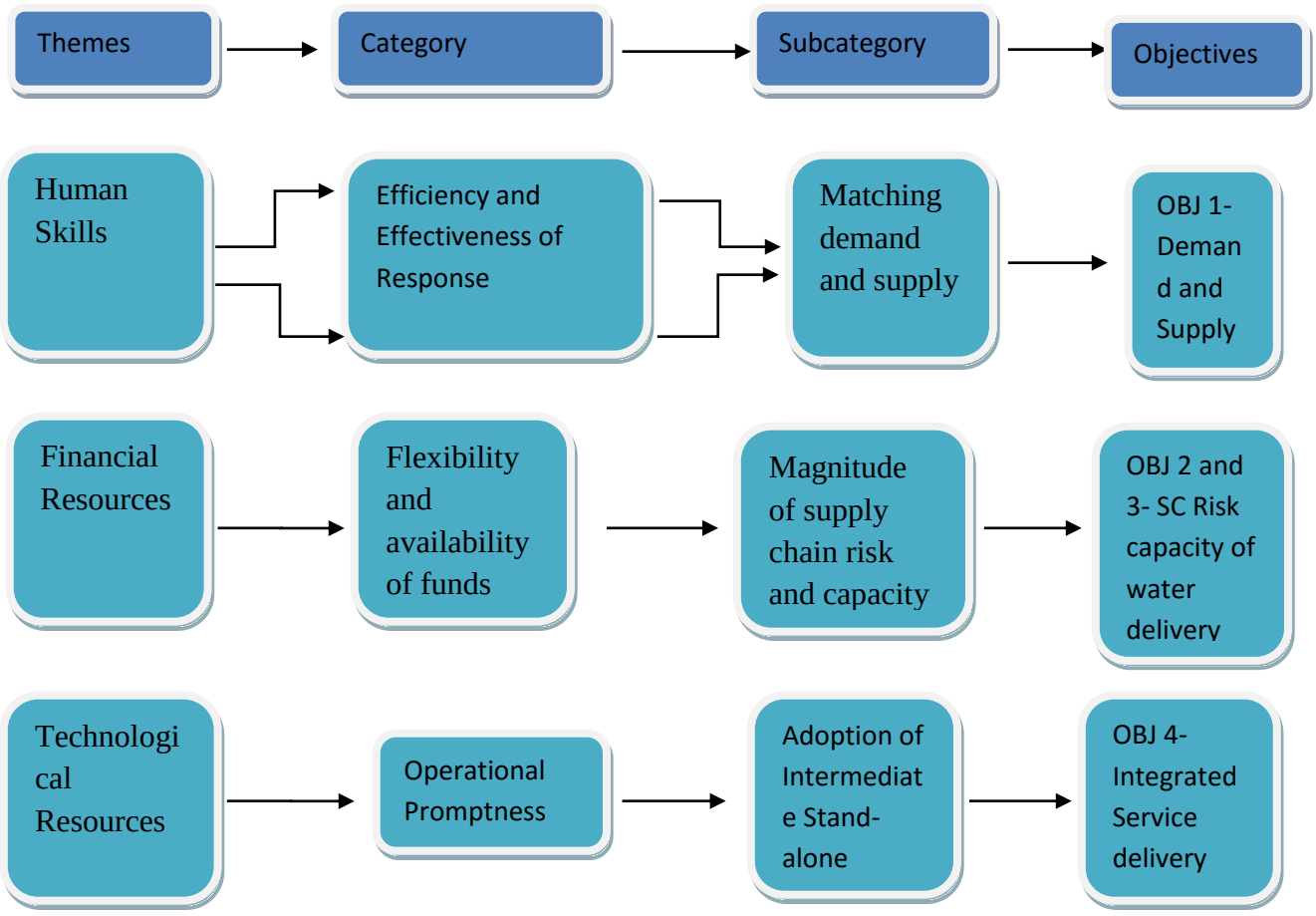
Table 4.3 indicates each respondent's number of years worked in a municipality environment. The assortment of these respondents used a purposive sampling (non-probability) in order to gain information relevant to the study. The respondents with many years of work experience enabled them to share their perspectives and experiences gained over their years working in

the public sector as well as an insight of the changes they have witnessed and their anticipation of impending future developments. The data collected from the interviews were analysed using thematic analysis as mentioned in chapter three and the findings are analysed based on common themes that are generated in the interviews by identifying, coding and categorising the data collected. This type of analysis allows for themes to emerge from the data that has been collected. This data is categorized under the themes so that it can be better interpreted and presented.

4.4 Analysis of themes

A thematic analysis is the first qualitative method of analysis that researchers should learn, as it provides core skills that are useful for conducting many other form of qualitative analysis. Through its theoretical freedom, thematic analysis provides a flexible and useful research tool, which can potentially provide a rich and detailed, yet complex account of data (Braun and Clarke, 2006:78). A thematic map refers to "the graphical presentation of themes, categories, and their relationships, involving a thorough explanation of each theme, their criteria and categories". As part of data analysis, it helps to outline the objectives that were achieved from the conducted interviews (Ranney, 2015:22). The figure below presents a thematic map that enables the researcher to meet the objectives of the study.

Figure 4.5: Thematic Map



4.4.1 Theme 1: Human Skills

An issue that became very perceptible when the researcher conducted the interviews with all the respondents was that of human skills. Human skills involve "the ability to work well with other people both individually and in a group" (Pablos, 2016:128). Human skills is referred as human resources in the public sector and is regarded as "a vital resource because people are the driving force behind the achievement of organizational goals; operational functioning, effectiveness and success" (Nkwana, 2014:85). It is, therefore, imperative that the people in an organization are skilled, inspired, competent, motivated and driven in the duties they perform to achieve organizational effectiveness. Furthermore, leadership development is important because there is a need for highly knowledgeable and well trained public managers on all managerial levels of the workforce which is accountable to its citizens in the provision of services (Auriacombe, 2014:121). Ligami (2017) is of view that "in order to strengthen human

skills in Africa, we need to achieve the right skills mix for young people. It is fantastic to see partners and governments converge around this idea, because there is no smarter shortcut to a bright future than education- when it is high-quality and relevant". Human skills in the private sector, for example, the World Bank, invests in people because it is the right thing to do and because people are often an untapped engine of inclusive economic growth (Dudar, 2014). In a supply chain management context, human skill means "having the ability to harness the power of human resource policies to ensure that the programs are implemented effectively throughout the organization" (Jurcevic, 2009:6). Having the ability to be skillful in the work presented to one I is crucial. It is one of the main priorities in the Zululand District Municipality as well as any given organization to have excellent working skills and it is a prerequisite for the employers (which consists of head of departments in the district municipality) to have good human skills as well. This is important because the employees are the ones that are able to get the best out of their employees. They know how to communicate, motivate, lead, and inspire enthusiasm and trust. The efficiency and effectiveness of the responses was a category established for this theme. These are further explained in detail below focusing on the subcategory.

4.4.1.1 Efficiency and Effectiveness of Response

Time is precious. When unexpected delays impede the progress of a task, many people become frustrated, annoyed, and eventually angry. Response times and slow display rates produce these conditions in the public sector (Herbert, 2017). There could be many reasons why this factor is brought into the surface. The impact of human skills is one of the reasons why time relapses in the public sector with regards to the operation of water supply in the Zululand District Municipality. Respondent 1 placed a lot of emphasis in providing details on the most important role-players in their own perspective in the municipality in response of delivering water efficiently to the community. Time seemed to be a major contributing factor when dealing with the operation of the supply of water. Resp 1 suggests that *"An important role-player is the people appointed for the provision of the delivery of the service which is of water in this case. These are important people because a project such as the provision of water can be planned appropriately by the person appointed for it, but, if the person chosen*

decides to not do the job efficiently and effectively, it becomes a problem and often leads to the delay of the service delivery".

Resp 7 supports the statement made by Resp 1 and added that *"If a political leadership stated they are implementing a water project by the year 2017 (time frame to be finalized), this information would then be communicated with the community members of the Zululand region. If the contractor on site decides not meet the deadlines, it affects everything in the supply chain operations because the project would not be finalized by the time that was promised by the municipality and the community. This will result in the dissatisfaction of the community members. It has happened before where contractors had not met the requirement of the project. This was caused by various reasons and one of them was the fact that they did not meet the requirements of the project. This was caused by them not knowing what was expected of them in terms of experience".*

In terms of human skills and time constraint, Resp 6 supported the proclamation made by both Resp 1 and 7 by stating that *"You can know what you have learnt from school but if you don't have practical experience, it becomes a problem. When a person goes on a field and are required to fit in pipes for the supply of water to take place, you cannot be asking questions on how to fit the pipe or even worse, make a mistake of putting in the wrong pipe. This often leads to supply risks associated with human skills and response time in terms of service delivery".*

According to the responses that were received from the respondents, it appears that effective collaboration and information sharing amongst municipal officials is essential for the speed of response in the Zululand District Municipality's service delivery process. The granting of speedily responses improves the ability of supply chain with regard to water supply in effectively carrying out its operations.

Resp 3 added to this statement and stated that *"What I've noticed is that there is no segregation of duties. Sometimes you would find that there's only one person in charge of everything. There is a big challenge in this regard because that would mean that if that specific person is unavailable, there is a standstill in everything that is required for the delivery of water. The big issue is that you would find that the person does not even form part of the supply chain management team. Here in the Zululand District Municipality, the person heading the supply chain management department does not have any powers or authority.*

They do not report to the chief financial officer but instead report to other people. That's a huge problem because the structure has been critically analysed and does not comply with the requirements of the SCM policy".

In addition, Resp 2 is of view that *"Political reasons behind protests are understood. Problems with service delivery need to be addressed. There have been many complains about the speed and the quality of responsiveness. The community members surrounding the Zululand region have every right to lay complains about the insufficiency of water supply in their homes respectively".*

Resp 4 also mentioned that *"All though my department does not deal directly with water provision, when you take a look at the other departments, especially the manner in which they conduct themselves, you can see that there's a lot of political interference. I'm not sure if the induction was done properly with the councilors to educate them about their roles and responsibilities. As you sit there right now you get councilors coming into my office, interfering in my business when they should be concerned with the water supply problems and responding effectively to the outcry of the community".*

Resp 5 further made a clear statement about skilled workers concerning the speed of response in the municipality. This respondent mentioned that *"We as the district municipality took over from the local municipalities in meeting the objectives of water provision in the surrounding area of Zululand. Some of the staff inherited from these local municipalities was not skilled. They couldn't read nor write. Some of them were not educated accordingly which contributed to the delay of water supply. You cannot quite fire them without tangible evidence of the work not being done as well as they have been working in these departments for quite some time".*

It is imperative for the municipality to initiate risk response strategies in dealing with the supply of water. Water has been said to be a basic commodity and without it, it could have a huge impact on the livelihood of the Zululand region as a whole. Resp 2 made a comment about the risk response strategies they initiate in order to supply water effectively. *"Since we identify ourselves as a municipality, there are mitigating factors in dealing with the speed of response of each official to supply this commodity. We as a department would need to collaborate with other departments to fix whatever is broken in the system. We've had to face*

an issue where the request for quotation as well as service providers did not respond on time which had a hindering factor on the speed of response".

It is evident from the above statements made by each respondent that the speed of response factor is identified as one of the critical factors that determine the success of response operations in skilled workers carried out by the municipality.

- **Matching demand and supply**

It is important for the municipality to establish to an adequate system for water supply in order to ensure they have the right employees performing the appropriate tasks every day. It also ensures that the municipality will have the right amount of people to get the job done. This is especially important for balancing supply and demand when it. It is imperative to match the demand and supply of water in order to establish the risks associated with the provision of this commodity. In terms of human skills and the constraint of time, Resp 2 stated that *"We currently have a challenge but we are trying to make means of training the staff in order for them to respond timely in meeting the demand of the community. In terms of matching the demand and supply of water, you would find that these workers are not skilled enough in supplying quality water as well as in meeting the demand of the people around the Zululand region".*

Resp 8 additionally added that *"There is a shortage of skills amongst officials which often leads to the fact that the supply component of qualified personnel does not often meet the demand required by the society in the operations of supplying water. The challenge for government is to evaluate and forestall the skills obligatory to support social improvement and a dynamic and comprehensive economic growth path".*

The supply component is most affected by the speed of response in terms of human skills. Although the respondents mentioned that the shortage of human skills impedes difficulties in meeting the demand of the community, it is best to look at the supply side of the provision of water. Resp 1 indicated that *"As soon as an outcry for water occurs in a specific area, it is the duty of the municipality to quickly respond to the matter. We are the people in charge of supplying water to the society therefore we have to be equipped to respond immediately to the issue. Let us take Nongoma for instance. It is an area around the municipality that is hugely affected by the issue of water as there is inadequate water supply. If for instance, a community*

member of this specific area lays a complaint at customer care, stating that they haven't had accessed to water for more than two days, it is then our duty as the officials to respond quickly to this problem and avoid more risks".

It is evident from the above responses and comments provided by the respondents that finding a balance between the demand and supply of water is of great importance in order to mitigate possible risks in the supply operations of this commodity. Because of the intangible nature of a service's output, establishing and measuring capacity levels for a service operation are often highly subjective and qualitative tasks. To maximize efficiency, the head of departments in the municipality ought to examine even peak-time tasks to discover if certain skills are lacking or are inefficiently used. If these skills can be made more productive, the effective capacity of the system for water supply can be increased. Time and speed are factors that have a hindering effect on whether the human skills provided by the municipality are effective or not.

4.4.2 Theme 2: Financial Resources

Management consists of various principles and aspects of which financial management forms the basis of performance against objectives in terms of the available resources. Financial management in the public sector is defined as "all decisions and activities of management, as guided by a chief financial officer, which impact on the control and utilisation of limited financial resources entrusted to achieve specified and agreed strategic outputs" (Jordaan, 2013:155). The aim of financial management in the public sector is to manage limited financial resources with the purpose to ensure economy and efficiency in the delivery of outputs required to achieve desired outcomes (effectiveness), which will serve the needs of the community (appropriateness) (Mwanza, 2013:4).

In the public sector, financial resources are steered by the chief financial officers who are delegated to accomplish quantified and approved premeditated outputs. In service supply chain, one of the most important roles of supply chain management is to contribute to the financial success of the organization (Chen *et al.,* 2014). Everything that is done by the Zululand District Municipality requires funds whether it is for delivering goods are even for the training of staff members and better yet, for the infrastructure required for supply operations. The researcher whilst interviewing the officials of the municipality found that this

theme appeared absolutely in every discussion which then indicated that it has a significant impact in the supply of water around the region.

Resp 1 when interviewed about the funds of procuring services affirmed that *"The role that the finance division plays in the municipality for the supply of water is to bill for the water that is provided to the community and as you are aware, we are a municipality and we are grant reliant. The water that is purified is billed by this division so that we can have some sort of revenue to make the municipality sustainable."*

Financial implications associated with the overall supply chain operations was mentioned quite a number of times which then leads to the establishment of the category. When reviewing the operation within the municipality, the flexibility and the availability of the funds granted to the municipality had an impact on the dimensions of risks associated with water supply. It is also imperative to further understand the financial implication of the magnitude of supply chain risk and capacity of the municipality.

4.4.2.1 Flexibility and availability of funds

Every organization, whether lean or agile, requires a certain level of flexibility in its supply chain operations. However, these levels of flexibility should make financial sense and should prove mutually beneficial to both the supplier and its customers. The flexibility and availability of funds element is important in any municipality as unexpected events occur that need the organisation to respond immediately. The inadequacy of quality water is one that will forever need to have funds available in all aspects. Resp 7 commented on the focus of availability of funds and stated the following: *"Funds are a challenge in this municipality. Money that we receive from the government is gazetted. The government decides how much money is to be given to each district municipality. The same government I'm speaking about will not critically analyse each backlog of water faced by each municipality in order to allocate enough funds based on each demand".*

Resp 4 additionally added that *"A big challenge is capital. We as the municipality could draw up a plan of new and improved systems of water supply to be put in place but we will always be faced with budget constraint. This is because the government does not allocate enough money for the provision of water to the municipalities that need it the most".*

Resp 7 is also of view that *"In some areas, you would find that there is water but is not drinkable water due to many reasons. There is a huge demand and the problem is that grants are not sufficient. The reason for these grants being insufficient is because Zululand District Municipality is a rural municipality. People around the surrounding area of this municipality do not pay for the services provided to them. Most of these people are unemployed. The municipality is grant dependent and these grants are not enough. This is why it will take a very long time for Zululand to supply quality water to the community".*

Resp 2 spoke directly about the planning of the budget in terms of water supply operations. This respondent felt that councilors were not doing their job effectively in terms of finance. They direct words were, *"We need to teach councilors about budget processes so that during these budget processes, they need to learn how to budget properly. We do not need them to come to us and interfere during the middle of the financial year".*

Resp 5 commented on the implication of financial resources and specified that *"We were the only municipality that was neglected in the past. For us, there are huge backlogs in concern of the provision of water. Nongoma and Ulundi are the most affected areas. If for example you take Mandlakazi area, the supply operations system is not doing well there. The ground water is salty whilst the demand increases every single day and we cannot even meet this issue with the current level of funding. We have done calculations in the municipality and we have established that we need about 3.2 billion rands but we are only currently getting 450 million rand a year. It will take a long time until we eradicate these backlogs".*

Resp 3 further indicated *"The flexibility of funds is a huge problem. Irrespective of how good your plans can be, if you do not have funding then that plan cannot be implemented. For example, we have an idea that in Usuthu we should build an off channel storage dam. That dam is estimated to cost about 1 billion rands as this dam is to serve the community both during rainy season and dry season. We have to now wait for water affairs for the approval and relevant funding".*

Resp 8 responded and affirmed that *"The availability of funds is a critical problem. New and improved approaches need money as well as change of mindset. We do not bill the community unfortunately and we cannot come in now want make a statement that every individual should*

be billed as a means to get more money. Grants are at the same level, they never increase whereas on the other side, demand increases. If we could come up with a system of flat rate, maybe there might be a change. Although it won't be much but it will make a difference".

- **Magnitude of supply chain risk and capacity**

Effective risk management is imperative to the municipality to fulfill its mandate, the service delivery expectations of the public and the performance expectations within the municipality. To manage risk, the strategies that need to be established by the municipality need some revenue as a start up to mitigate these in the future.

Resp 6 stated that *"It is expected that all departments operations and processes will be subject to the risk management strategies in order to mitigate the risks associated with delivering water to the community. It is the intention that these departments will work together in a consistent and integrated manner, with the overall objective of reducing risk, as far as reasonably practicable".*

Resp 4 is of view that *"The supply chain-related risks in the municipality should receive financing support and grow rapidly, so as to solve the supply chain problem of uneven distribution of funds and upgrade the entire supply chain with regards to service delivery".*

Resp 1 confirmed that in the municipality, risk assessments are usually done. Each department specifies which risk they face individually. The respondent's direct words were *"For example, the finance department is the internal customers in each department. Unfortunately, even so, there are risks that this department faces. If there is no money, one is unable to perform any task. The risk that the finance department faces is of limited financial resources both on the grants received for implementation as well as for refurbishment. You cannot repair anything without funding. Since we identify ourselves as a municipality, of course there needs to be mitigating factors. We have to repair whatever is broken in order to get maximum customer satisfaction".*

4.4.3 Theme 3: Technological Resources

Despite astonishing technological developments since the manufacturing revolution, societies have not yet prospered in handling the growth, spread, and unpremeditated effects of technologies resourcefully and reasonably. Technology is inevitably a disingenuous weapon,

and technological development produces equally constructive assistances to human well-being and undesirable conservational and social impacts. According to Naidoo (2017) governments must seize the opportunity to re-evaluate their approach on how to implement and utilise new technology to provide better services for citizens, while also decreasing the cost burden.

Resp 3 mentioned that *"The key implications of applying infrastructure asset management solutions outlines why it has become imperative for municipalities to incorporate it in their approach to ensure consistent, reliable service delivery to their communities".* In terms of water infrastructure, Resp 7 stated that *"Water resources infrastructure includes dams, weirs, canals, pipelines, reservoirs etc; in fact, anything that is used to store, divert or manage the water in rivers i.e. "raw" water. Apart from planning that generally falls under water resources management, the procedure will include establishment, operation and maintenance".*

Good management of technological resources for sustainable development should directly address the difficulties in the Zululand District Municipality in water supply operations. The categories of operational promptness are discussed below with regard to water supply.

4.4.3.1 Operational Promptness

Operational promptness is an anticipated variable which the Zululand District Municipality should always pursue to accomplish in order to improve its capability to carry out the operations of water supply successfully. There should always be a responsibility for the development and implementation of processes, systems and strategies designed to procure and sustain infrastructural capacity required by the municipality in its quest to provide quality services to the community as well as ensuring that resources at the municipality's disposal are equitably distributed to all areas of operation to enhance service delivery to benefit the people. The following are some of the comments made by the respondents on infrastructure.

Resp 6 believes that *"The infrastructure that we have already in place for water supply is ageing. It is very old because, remember, this responsibility was taken from local municipalities who were performing this function before we as a district took over. We do not get funding for just refurbishment of assets alone, so we end up having a problem trying to*

refurbish these assets with our own funds which we sometimes do not have because the consumers that we are billing do not pay".

Resp 8 additionally added and asserted that *"The issue of drought is one that was faced by Zululand District Municipality in the year 2016. We are still even today, addressing this issue by building schemes. There is one which is water tankers that are supplying the community with water at the moment. I've heard that they have tried to install trackers on these water tanker vehicles in order for them to confirm that the water is delivered in a specific area. The system failed. The municipality failed to keep up with this system as they did not receive full invoices at the end of the month. The tracker was trying to address the problem and actually confirm that people got supplied water. The community currently is trying to cheat the system".*

Resp 4 is of view that *"Apart from funding, the schemes that are already operational need to keep operating and to be monitored. We are a rural municipality which also means that we do not generate enough revenue to actually operate and maintain the existing schemes. As a result, we are not spending enough on maintenance. It's like buying a car and not getting it serviced. The actual life span (expected lifespan) will not be achieved".*

Moreover, Resp 2 added that *"What is important for the municipality is to monitor the water quality. That is why there are control rooms in the plants that we have. There are different tests that actually are conducted before the water is released to the community. We got a component to operate and maintain our large regional schemes to make sure that at least it's properly operated and maintained. The major regional schemes are operated by a company called Water and Sanitation Services South Africa (WSSA)".*

Resp 5 further explained the importance of supply chain management with regards to infrastructure in the municipality by stating: *"Remember that the supply chain management process cannot be excluded in any procurement aspect. When procuring infrastructure asset then your involvement starts at the BID specification committee whereby they will look at your design report and what is that you want to procure and what you have specified actually makes sense. The operation and maintenance of the infrastructure required for the supply of water is of importance. There needs to be systems in place for the purification of water. The ones*

that we have currently are giving us so many problems because there have been many complaints of the quality of water that the community is currently getting".

Resp 3 stated that *"Another problem with the municipality's infrastructure is that it tends to break most of the time and then they have to shut down every production that needs to take place. Some machines used for water supply are so old that they start creating mud. The mud flows and eventually gets to the seal where the water is meant to come out. It gets stuck leading to water not getting distributed to the community. The risk of it all is that the municipality has to immediately find the right person to repair this machine and prepare a requisition and only then can the order be made. If there's no funding, they must source within their departments".*

- **Intermediate Stand-alone Schemes**

The surrounding areas in Zululand do not have access to quality tap water and they have to rely on certain sources for the provision of this commodity. The implementation of stand–alone schemes by the Zululand District Municipality has helped to facilitate the constant battle between the demand and the supply that ought to be provided by the municipality.

Resp 5 pointed out that *"The Zululand District Municipality started a comprehensive water master planning exercise to determine the most appropriate methods of providing previously neglected communities with water services. In all cases, the main drivers were to obtain the technical solution that will not necessarily be the lowest in terms of capital requirements to implement, but rather that will provide a sustainable service throughout the year at the lowest possible water tariff. The first step was to identify sustainable water sources in the district that could be used to provide water supply even during extreme drought situations and then to determine the most cost efficient way of supplying communities with these sources".*

Additionally, Resp 7 affirmed that *"Each regional scheme footprint has a sustainable water source from where infrastructure is progressively being rolled out to all households within the supply area. The supply footprints have been identified in such a way that water can be provided to all households within the area in a sustainable manner and at the lowest possible cost yet we still face a lot of risks".*

Overall, due to the many funding and human capacity constraints faced by the public sector, technological solutions can help municipalities fulfill their infrastructure as well as their asset management. Municipalities, therefore, have much to gain from exploring and taking advantage of technological advances through public / private partnerships. This can both legitimate their activities through facilitating clean audits and enhance their efficiency when it comes to service delivery and socio-economic development.

4.5 Conclusion

The opinions and perspectives of the respondents interviewed in this study indicate that the issue of water supply is very much present in the surrounding areas of the Zululand region. It is not just one factor but many factors that contribute to the inadequacy of water provision. According to the majority of the respondents, they believe that it will still take a while for this problem to be eradicated if the municipality does not make this issue a priority. The ever so increasing demand is present from the respondents' point of view and steps need to be initiated before it gets out of control. The views of the respondents also indicated that although they may have strategies in mind that have not been implemented yet, it would still be a problem because of the biggest issue which is that of capital. It is thus important to understand the dimensions of supply risks in the supply of water at this municipality in order to mitigate possible risks in future.

CHAPTER FIVE

DISCUSSION OF RESULTS AND RECOMMENDATIONS

5.1 Introduction

At the beginning of the study, the research problem clearly indicated the purpose of the study. Municipalities are still faced with many risks in order to mitigate excessive demand of service delivery. As a result, service delivery protests are formed by the citizens to address some of the issues they face. For the purpose of this study, it is of importance that municipalities discover their dimensions of supply risks in fulfillment to mitigate possible risks that may lead to unsatisfied community members. The municipality, most importantly, needs to implement ways to manage its supply chain operations as well as to address the issues faced in their supply chain risk management in order to achieve adequate water supply. The previous chapter dealt with data analysis and interpretation of the findings. The study sought to establish the dimensions of supply risks in the supply of water which looked at the Zululand District Municipality. The objectives of the study have been achieved and certain conclusions may be drawn. The limitations and the delimitations of the study are highlighted as well as the conclusions and recommendations of the study.

5.2 Overview of research objectives

This chapter reflects on the main research objectives of the study. This framed the premise of this study. It is in this manner to critically show how each objective has been accomplished and met over the span of the study. Having accomplished every one of the objectives of this study, suggestions are made with a specific end goal to influence the overall contribution to the study and furthermore to enhance the supply chain operations as well as creating mitigation strategies for conceivable risks in the near future. The discussion to follow is derived from both secondary and primary data sources collected during the research study in an attempt to establish dimensions of water supply risks in the Zululand locale.

5.2.1 Objective One

To establish the degree of balance between water supply and demand characterized by the driving forces of service delivery.

The first objective of this study seeks to find the balance between water supply and water demand of the Zululand region. In planning for future water needs, it is momentous to establish how much water the Zululand District Municipality can provide (supply), and how much water is needed by the community (demand). According to Scully (2013), today's leadership quality of any organization needs to be agile – to serve multiple strategic roles across the enterprise while driving a variety of programs and servicing varying levels and/or business units in an autonomous way. Given these complexities, how can human skills capacity achieve the perfect balance between centralizing key functions, while at the same time focusing domain expertise and maintaining just-in-time support across the organization?

One can deduce that there is a lot at stake in creating human skills that are effective. Already-tight resources and budgets depend on it. The good news is that advanced models that integrate the capacity of agile human skills and technologies take advantage of things like social media, real-time consultation with experts and dynamic knowledge centers. The resulting benefits can give anyone a leg up in achieving the perfect fit for their human skills capacity in the municipality's supply chain. Human skills is referred to as human resources in the public sector and is regarded as "a vital resource because people are the driving force behind the achievement of organizational goals; operational functioning, effectiveness and success" (Nkwana, 2014:85).

The responses provided by the respondents of the study supported the importance of acquiring human skills in the municipality. When interviewed, they mentioned who the important role-players are when it comes to the provision of water. These role-players are important because of the magnitude of the projects they are provided with, such as the provision of water. If such a project is implemented, the person chosen is required to deliver work of great ethics. If they fail to do so, it becomes a problem and hinders the supply side and often causes a delay. The key issues of supply risks are identified with a supply system design, the location of suppliers and suppliers' agility, flexibility, delivery dependability and infrastructural quality, as well as coordination and data sharing. According to Meixell and Gargeva (2005:531), this type of risk is called upstream risks because it is related to procurement and is construed to be a huge threat to supply affirmation and improper supplier selection and uncertainty in supply lead time.

The driving forces for service delivery in the municipality were derived from the literature provided in chapter two. The force field analysis created a platform for this study to indicate the driving forces that drive for change in water supply. These driving forces for change were community satisfaction, sustainable costs, high performance goals, lean and agile practices and lastly new technology. Since the literature from chapter two on both service delivery and the force field theory assisted the researcher in establishing these driving forces, it was then established in chapter four from the responses provided by the respondents what the restraining forces were in water supply operations.

It was established from the views of the respondents that water shortage has already been experienced in the Zululand region as a result of droughts. In an attempt to overcome this predicament, the municipality has established that they needed to manage the demand side far better than they have done so far. When you take a look at these driving forces of service delivery, the municipality has a long way to go in meeting the objective of adequate water supply. The community members in the area still continue to demand water. As the years pass by, this demand increases due to the risks that were established. This then leads to how the driving forces and restraining forces can be balanced out in order to implement change in the municipality. The risks amongst the many mentioned whilst conducting the interviews are risks such as the municipality not having adequate resources and funds to eradicate the insufficiency of water. The municipality needs a range of skills and understanding to be able to deal with various issues and have the ability to review and challenge management performance in different departments.

Based on the information provided by the respondents, demand is only met if the outcry is visible which then makes sense for the municipality officials to respond to these needs efficiently. What is meant by this is the fact that the officials in each department responsible for service delivery cannot predict whether an issue exists or not. The respondents made it clear during the interview that community participation is one of the ways that could assist in meeting the demand for water as well as mitigating future supply risks. According to the Carbon Disclosure Project (2014), “demand for water had been projected to outstrip supply by a staggering 40 percent by 2030 and an estimated half of the world’s population is likely to

live in areas of high water stress by the same year". The statement made by this project indicates that the issue of water is one that needs attention now and in the near future.

The restraining forces for change derived from the driving forces were as follows: inadequate sources of water, lack of funding, bad planning, organizational inertia and an ageing infrastructure. The balance between these forces can contribute in the knowledge of the municipality's organizational change in water supply as the two forces do actually balance each other out with the aim of meeting actual supply with actual demand. The establishment of the driving forces of service delivery which were mentioned above creates a pathway for the Zululand District Municipality to establish the supply operations risks faced in delivering basic services in the region of Zululand.

5.2.2 Objective Two

To determine the extent of supply risk management of water within the restraining forces of the Zululand District Municipality.

This objective sought to determine the degree of supply risk management of water within the restraining forces of the municipality. Chapter two of the study contributed to the knowledge of supply chain risk management in the public sector. This objective of the study sought to determine the extent of supply risk management of water based on the restraining forces. In the first objective, the researcher established the driving forces of the study and, therefore, was able to determine the restraining forces based on the responses provided in the interview by the respondents. It was firstly imperative to inaugurate what the risks were for the supply of water in the municipality. The essence of the study emphasizes on clear understanding of what caused the inadequacy of water supply in the municipality's supply chain operations. To recap on some of the causes of water supply, these include:

- Lack of funding
- Inadequate sources of water
- Bad planning
- No cost effective methods
- Ageing infrastructure
- Sittling of dams (No storage) etc.

The engagement of the respondents highlighted that it is expected of all the departments' operations and process to subject to the risk management strategies in order to mitigate the risks associated with delivering water to the community. It is the intention that these departments will work together in a consistent and integrated manner with the overall objective of reducing risk as far as is reasonably practicable. It is also vital that the supply chain-related risks in the municipality receive financial support to grow rapidly so as to solve the supply chain problem of uneven distribution of funds and thus upgrade the entire supply chain with regards to service delivery. Additionally, supply chain risk management in water supply is the identification and evaluation of risks and consequent losses from the supply chain, and implementation of appropriate strategies through a coordinated approach among supply chain members for supply chain outcomes that lead to close matching of actual supply with actual demand.

In addition, there was an analysis of different types of supply chain risks that could arise in the municipality with regards to the operation of water supply. The first objective established a balance between the demand and water supply by the driving forces of service delivery. The supply chain risk management framework mentioned in chapter two could be used as a tool to manage risks in the municipality in order to meet the demand of the community. This strategy includes risk identification, risk assessment, risk response and risk monitoring. In relation to water supply, using the SCRM framework could be a useful tool in eradicating water supply problems in the supply chain operations department.

Given the increasing demand of water, it is no longer enough for the municipality to identify the places where their operations are vulnerable to water shortage problems. The management of supply risks using the restraining forces is important in order to mitigate the risks in the near future. It is also imperative to critically analyse the types of risk associated with the supply of water in this section in order to determine the extent of the risk management in the supply chain operations. The types of risks that were faced by the supply operations of water were financial risks, strategic risk, operational risk, technological risk, human risk as well as fame and law risks.

The restraining forces of the Zululand District Municipality are the risks faced in water supply operations. Water is very delicate and in order to provide this service, risk identification, risk

assessment, risk response and risk monitoring and evaluation could be helpful in striving towards decreasing the forever increasing demand in the municipality. One of the respondents during the interview mentioned how it is important for the organization to monitor the quality of water. The water plants system that is currently in place consists of control rooms where different tests are conducted before the water is released to the community. What the researcher established is that although they ought to run these tests, funding is a huge factor in the contribution of the tests that need to be conducted for the water operations. In this point in time, the management of these water supply risks is not adequate because of the increasing demand in the surrounding area of Zululand.

5.2.3 Objective Three

To determine the magnitude response capacity of the Zululand District Municipality to mitigate the supply risk of water delivery.

The third objective seeks to establish the magnitude of the response capacity of the municipality (system) to mitigate water supply risk. The finding in chapter two reflected that it is viewed as essential to determine the appropriate response method to start with, then to design responses to put into practice the chosen strategy. This stays away from the 'scatter-gun' approach where a number of alternative responses might be proposed some of which may refute the impact of others. Deciding the technique initially could guarantee that the responses aim for a similar objective and thus maintain a strategic distance from worthless exertion. There is no single best response procedure and each risk ought to be considered on its own merits.

Harrison and Van Hoesk (2008:130) identify the dimensions of an agile supply chain widely used in aiding the adoption of successful supply chain management operations. These are suggested for the municipality to be customer responsive which is defined “as the capability of reading and responding to the end customer demand”. There has been an increasing focus by the municipality to have operations that are responsive in meeting the demand efficiently and timely. In accomplishing this, the researcher found that there has to be closer communication with all the stakeholders involved and also a value-added focus and approach in the supply chain management planning of the municipality.

The respondents in this regard came with an assortment of measures such as; bringing new machinery and pipes to draw water, water tanks and bore holes; usage of other dams to augment the current one, equal distribution of water, minimizing watering of lawns and the municipality must solve the problem. Other respondents brought to the table suggestions such as that the municipality must involve the affected people and should allocate enough budgets to the water infrastructure. It was also mentioned that effective collaboration between the different departments may have an impact in the magnitude of response capacity to mitigate supply risks of water delivery.

The municipality states that they conduct risk assessments for each department to specify which risk they are currently facing in meeting the demand of the community. The municipality has developed a system of accessing things before taking any steps. They are of the view that one needs to know the parameters in terms of cost to avoid overcharging in trying to mitigate the risk. In the previous chapter, it was indicated that one of the respondents asserted that there is no segregation of duties and that there is only one person in charge of everything. These respondents further stated that the structure does not comply with the regulations of supply chain management.

The researcher is also of the view that the lagging behind of the supply chain management in the municipality has been the contributory factor in the increase of the demand for water in the community. This has been a result of delayed response which is something that can be resolved by the adoption of the best practices of supply chain management. Furthermore, if the municipality develops a corporate water strategy that better understands the current state of risk at the municipality level, water footprint, both locally and across the value chain can be understood. The municipality needs to facilitate internally at a corporate level and externally with the community to evaluate the risks and its impacts.

5.2.4 Objective Four

To analyse whether the integration of service delivery activities enhance the supply component of water.

The last objective sought to evaluate the integration of service delivery activities that ought to enhance the supply component of water provision. Literature from chapter four reflected that there should always be a responsibility for the development and implementation of processes,

systems and strategies designed to procure and sustain infrastructural capacity required by the municipality in its quest to provide quality services to the community as well as ensuring that resources at the municipality's disposal are equitably distributed to all areas of operation to enhance service delivery to benefit the people.

The adoption of service delivery in South Africa can be measured from two different fronts. In most instances, the extent of service delivery is measured from the demand side. This demand side can be measured by surveys such as population census and community surveys which are collected from households focusing on the extent, type and quality of services that they receive. It has become somewhat common knowledge that supply chain management in the public sector in South Africa is unsatisfactory. There are constant accusations of dishonesty and disorganization. Service delivery protests are an indication that people feel that they are not receiving the magnitude or quality of services they require.

An effective supply chain management in service delivery must objectively ensure that services are available in the right quality, at the right time and in the right place. Constantly having to make decisions about how to balance these objectives is demanding and challenging for any municipality. It needs a cohort of supply chain management professionals with the right skills, experience, social awareness, ethical standards and dedication; and a regulatory and organizational environment that supports and monitors their work in the public interest. Chapter two of the study provided literature that stated that the White Paper on Water Supply and Sanitation Policy (1994:3) encourages advancement that is demand-driven and community-based. When it comes to water supply and sanitation, the role of the central government is to deal with the country's water resources, to guarantee that every citizen has access to essential services including water. Monitoring and auditing within the jurisdiction of the national government is of great importance.

Apart from funding, the schemes that are already operational need to keep operating and to be monitored. The Zululand District Municipality is a rural municipality which also means that it does not generate enough revenue to actually operate and maintain the existing schemes. As a result, it is not spending enough on maintenance. The Zululand District Municipality must strive to have in place effective and efficient governance and management structures to implement the municipalities' strategy as well as key systems to ensure operational

competence (Carver, 2005). These systems include Water Infrastructure Asset Management Systems; Water Infrastructure Planning Systems; Billing and Metering Systems; Financial and Treasury Systems; Human Resource Systems; Supply Chain Management Systems; Information Management Systems; Governance and Risk Systems, and Corporate Performance and Strategy Systems (Umngeni Water Annual Report, 2009: 15).

The respondents contributed to the knowledge of this objective by clearly stating how the SCM activities are considered as being part of the municipality's water supply. There is no procurement of water supply without the SCM through the BID committee system. Transparency of the Integrated Development Plan (IDP) is considered. When there is development of the Water Services Development Plan which is in the IDP, the comments of the public are opened. Community participation in planning, implementation and management of water is feasible. The researcher that the integration of service delivery activities enhanced in the supply component of water is feasible as it harmonizes the relation between demand and supply.

5.3 Data Quality Control

This section critically analyses how to control the quality of the data collected. This is a critical part of data collection as there needs to be high quality so that decisions can be made on the basis of reliable and valid data. The following are some of the measures that the researcher took in order to validate the reliability and trustworthiness of the study.

To ensure the trustworthiness of the data collected, the following measures were employed:

- Credibility: Engagement with the data (recordings, notes and transcripts) was done intensively to demonstrate clear links between the data and the interpretations. The interviews were recorded using a device to capture what was said by the respondents. Notes were taken intensively to aid as a guide. The researcher then transcribed the data recorded by transferring what had been said during the interview into readable data. The background, qualifications and experiences of the participants were clearly visible in the study. **Appendix B** (Interview Guide) contributed to the assessing of each respondent in order to better know them. Questions were simplified to a language understood by the respondents and these were highly regarded because of purposive sampling. This was achieved by purposely choosing expects that have knowledge of

the topic. To ensure credibility of the study, **Figure 4.5**(Thematic map) illustrated the objectives that respond to each theme.

- Confirmability- to ensure confirmability in the study, the results of the experiences and ideas of the participants were clearly stated, rather than the characteristics and preferences of the researcher. There are also known data collection and analysis methods used in the study which allows other researchers to evaluate the study. An audit trial was implemented to ensure that the data and interpretations of the findings were sound and confirmed findings. Olivia (2017) states that an audit trail is when a qualitative researcher details the process of data collection, data analysis and interpretation of the data. The intention during the interpretation process was not to generalize the findings to a population but to identify accepted principles and trends related to the research topic.
- Dependability- According to Riege (2003:81), dependability is analogous to the notion of reliability in quantitative research. In order to allow people to have a clear understanding of the processes involved in this study, a clear detailed description of the research design and how it was implemented (key components have been used, for example, sampling) has been given. The purpose of this was to show indications of stability and consistency in the process of inquiry. Care was taken to ensure that the research process was logical in terms of how and method were appropriate, traceable and clearly documented in a reflexive manner by giving a detailed account of the research process.
- Transferability is described as being concerned with whether the findings of the study can be applied to other similar studies. However, in qualitative studies this has been recognised as being unfeasible to attain since conclusions can be made of a qualitative enquiry (Koonin, 2014). For the rationale of this study it is significant to guarantee that the conclusion and data can be easily transferable to other municipalities that are faced with similar water supply risks. Although this study is qualitative in nature and is based on interviews which disregarded people's feelings and emotions in future studies, the data collection and analysis methods were used. This has the influence of allowing other researchers to evaluate the study since they would have access to all the data.

5.4 Contributions of the study

Municipalities are continually looking for more efficient ways of successfully managing their supply chain risks. Therefore, the conclusions derived from this study may offer feasible solutions to the management and control of supply risks in the provision of water. In addition, the main areas for future research have been identified so as to allow other researchers to look for ways in which other municipalities can further address others risks that could be faced with regards to service delivery as a whole without necessarily being confined to water supply.

5.5 Recommendations of the study

Water supply has been a sensitive issue in the Zululand region for a long time now. The community in this region is faced with a serious problem of inadequate water supply. This segment will consequently, grounded on the outcomes from the data collected commend some actions to be deliberated upon with a mandate to correct the water supply and water demand imbalances. The researcher will therefore use responses from the research interview questions used for gathering data.

The respondents' responses were gauged in respect of the issue at hand and most of the responses indicated that the current state of water supply within the region is challenging. There are schemes in place for the community and the municipality is trying by all means to make sure that the concerns of the people who do not have access to water are prioritized. The Zululand District Municipality is trying to minimize interruptions with supply risks that were mentioned earlier on. There are interventions for different water schemes in terms of the systems such as the conventional supply system, soring protections, underground water such as boreholes and water tankers which are the most expensive. The recommendation is that the municipality should critically analyse, besides the risk of funding they mention constantly, how the other district municipalities that are faced with the issues which are by and large similar manage to utilise their resources efficiently to meet the demand of the community.

In order for the municipality to be effective and efficient, it must have people with positive attitudes and clearly-defined responsibilities and have a comprehensive customer data base. The issue of the scarcity of water is one that requires specialised skills in order for the operation of water supply to be effective and efficient. It is, therefore, important for the Zululand District Municipality to improve human capacity in all the departments. The concept of operational excellence is one that needs to be established within the Zululand District

Municipality. The current activities within the municipality could be achieved through focussing on customer needs and keeping the departments positive and empowered.

It is also important for the municipality to provide the community with reliable water services that can be trusted by the people and other stakeholders. In order to accomplish this, the municipality must be able to offer a twenty-four-hour service call centre and be able to decrease demand and advance consistency; reduce the number of service interruptions and improve community awareness. Community participation in planning, implementation and management of projects are feasible because they allow the supply component to be efficient by knowing the demand side.

The concept of agility, responsiveness and flexibility can be made as one of the most important recommendations of the study in order to guide the municipality in meeting the actual demand for water. Lean and agile practices will fix organizational inertia. The researcher recommends virtual supply chain management in establishing the dimensions of supply risks faced by the municipality with regard to the supply of water as it can inherit flexibility in the municipality to quickly adopt and adapt to changes in the supply chain operation.

5.6 Limitations and Delimitations of the study

According to Cooper and Schindler (2006), all research studies have their limitations and the sincere investigator recognizes that readers need aid in judging the study's validity. This study is no exception as there were limitations and delimitations identified by the researcher.

Firstly, this study only addressed the Zululand District Municipality alone. Therefore, it cannot be generalized for all the municipalities and the areas that have been severely affected by not having access to quality water. Time was a critical factor in this limitation as the researcher would not have been able to cover more than one municipality based on the fundamentals of the study. The Zululand District Municipality was purposively chosen as it is amongst the few severely affected by the inadequacy of water. Secondly, although semi-structured interviews were meant to be conducted for nine officials in the municipality, the researcher was only able to interview eight of them and the cause of this was due to the availability of the other respondents. The researcher also had to make means of going back and forth to the municipality as the selected officials were not all available at the same time on

the date specified. It was important for the researcher to conduct these interviews as each of these participants had valuable contributions to make to the knowledge and understanding of the foundational basis of the study. Despite the limitations and delimitations of this study, there is an opportunity for future researchers to further investigate this study. These give them a pathway to explore the objectives of this study further.

5.7 Conclusion

This research study has been influenced by the increasing number of service delivery protests experienced in the surrounding area of Zululand for citizens demanding for water. As a result, a number of community members are without adequate water supply in their homes. The consequences of supply risks which have been experienced in the system of supplying water have resulted in supply chain risk management of the Zululand District Municipality. The community members have suffered tremendously with the absence of water in this area like the loss of lives, sickness through water from the river as well as dehydration.

In light of all the findings deducted from this study, municipalities should be motivated to improve their supply chain operations in order to ensure that they improve and mitigate supply risks in not just water supply but service delivery as a whole. This study has focused on establishing dimensions of supply risks in the supply of water in the Zululand District Municipality. This study therefore presented an opportunity for other municipalities with the same problem of water provision to identify supply risks in their area to ensure successful and improved supply chain operations. The findings presented also demonstrated the importance of the balance between water supply and water demand as a pathway of improved supply risks.

References

Abend, G. (2013). The Meaning of Theory. *Sociological Theory* 26 (June 2017): 173–199. San Francisco, CA: Berrett-Koehler Publishers.

Adams, G., and Campbell, M. (2005). Where Are You on the Journey to ERM? Risk Management Magazine, September: 16-20.

African Development Bank. (2000). African Development Report. New York: Oxford University

Agrawal, A., Catalini, C., and Goldfarb, A. (2011). The geography of crowfunding (NBER Working Paper No. 16820)

Alfalla-Laque, R., and Medina-Lopez, C. (2009). Supply chain management: Unheard of in the 1970s. core to today's company. Business Histag 51 (2): 202-221.

Ambe, J., and Badenhorst-weiss, J. (2011). An exploration of public sector supply chains with specific reference to the South African situation, 46(3):1110-1115

Ambe,I., and Badenhorst-weiss, J. (2012). Supply chain management challenges in the South African public sector. African Journal of Business Management. (44):11003-11014.

Anderson, R. (2007). Thematic Content Analysis (TCA): Descriptive Presentation of Qualitative Data (Online). Retrieved/from: http:www.wellknowingconsulting.org/publications/pdfs

Asmah-andoh, K. (2009) .Implementation of developmental local government for alleviating poverty and inequality. Journal of Public Administration: 100-110. [sabinet online, saepublications, full display: http://www.sabinet.co.za]

Atkinson, D. (2007). Taking to the streets: has developmental local government failed in South Africa?

Arlbjørn, J., Freytag, P., and de Haas, H. (2011). Service supply chain management – A survey of lean application in the municipal sector. International Journal of Physical Distribution & Logistics Management, 41(3): 277–295.

Auriacombe, C. (2014). Leadership: Principle, Triats and skills. UJ internal handbook. Johannesburg: University of Johannesburg

Aylward, L. (2015). Exploring the role of patient care workers in private hospitals in the cape metropole. M.ed thesis Stellenbosch University

Babbie, E and Mouton, J. (2001). The Practice of social research, Cape Town: Oxford University Press.

Ballou, R., and Burnetas, A. (2003). Planning of Multiple Location Inventories. Journal of Business Logistics: 65–89

Baltacioglu, T., Ada, E., Kaplan, M., and Yurt, O. (2007). A new framework for service supply chains. The Service Industries Journal, 27(2): 105–124

Baulcomb, J. (2003). Management of change through force field analysis. Journal of Nursing Management: 275-280.

Baxter, P., and Jack, S. (2008). Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. Vol 13(4).

Bayat, M., and Meyer,H. (1994). Public Administration, Theory and practice. Pretoria: Southern

Bent, R.A. (2014). The significance of supply chain management with regard to the attainment of value and strategic objectives for municipalities within South Africa: a case study (Master's Thesis), Science at Stellenbosch University, South Africa.

Berg, L. (2009). Qualitative Research Methods for the Social Sciences. Pearson international edition. Toronto, USA(8) : 46-51.

Bernard, R. (2010). Research Methods in Anthropology, Qualitative and Quantitative Approaches, 4th Edition, Rowman Altamira Publishers.

Bios, M., Quaddus, M., and Watanabe, K. (2009) Supply Chain Risk Management (SCRM): a case study on the automotive and electronic industries in Brazil, Supply Chain Risk Management: An International Journal: 247-252.

Bless, C., Higson-Smith, C., and Kagee, A. (2006). Fundamentals of Social Research: an African perspective, Fourth Edition, Juta and Co. Ltd, Cape Town.

Boateng,T. (2010). Government service delivery lies in Supply Chain Management, not centralized procurement. [online]. Available: http://www.smartprocurement.co.za/archives

Boshoff, C. and Mazibuko, E. (2008). Measuring customer satisfaction with a municipality‟s waste management service: a preliminary instrument. Management dynamics. [sabinet online, saepublications, full display: http://www.sabinet.co.za]: 14-26

Boute, R., Disney, S., Lambrecht, M. and Houdt, B. (2007). An integrated production and inventory model to dampen upstream demand variability in the supply chain. European Journal of Operational Research, vol. 178(1): 121-142.

Bowersox, D., Closs, D., and Cooper, B. (2010). Supply Chain Logistics Management, First Edition

Brannan, W. (2007). Director, University Risk Management .The Medical University of South Carolina Charleston, South Carolina.

Braun, V., and Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology. ISSN 1478-0887: 77-101

Braun, V., and Clarke, V. (2012). Thematic Analysis. APA handbook of research methods in psychology: Research designs: Quantitative, qualitative, neuropsychological, and biological: 57-71.

Braun, V., and Clarke, V. (2013). Teaching thematic analysis: Overcoming challenges and developing strategies for effective learning. The Psychologist ISSN 0952-8229: 120-123.

Brink, H. (1991). Validity and reliability in qualitative research. Curationis 16(2): pp. 35- 38.

Buhlungu, S., Daniel, J., Southhall, R., and Lutchman, J. (2007). State of the Nation South Africa. Cape Town: Human Science Research Council press

Burgon, R. (2013). The five step guide to risk assessment. WorkPlace Safety Blog.

Burns, N., and Grove, S. (2003). Understanding nursing research. 3rd ed. Philadelphia, W.B. Saunders Company.

Buthelezi, J. (2017). The implementation of customer care at the causality department of Edenvale Regional Hospital in Gauteng Province. University of South Africa.

Cavana, R., Delahaye, B., and Sekaran, U. (2001) Applied Business research: Qualitative and quantitative methods. John Wiley and Sons, Inc.

Cavana, R., Delahaye, B., and Sekaran, U. (2001). Applied Business Research: Qualitative and Quantitative Methods. John Wiley and Sons Australia, Milton.

Chabot Space and Science Center. (2014). Should water be a commodity or a right?

Chemoiywo, P. (2014). Public procurement procedures and supply chain performance.

Chen,C., Defee, C., Gibson,B., and Hanna,J. (2014). Defining the supply chain. The Definitive Guide to integrated supply chain management: pp 6.

Chetty, M. (2015). An integrated debt management model for municipalities in the Free State.

Chopra, S., and Meindl, P. (2007). Supply chain management: Strategy, Planning and Operation. 3rd ed. International Journal of Productivity and Performance Management. Vol 56.

Chopra, S., and Sodhi, M. (2014). Managing the cost of risk reduction in the supply chain. The European financial review.

Christopher, M. (2015). Logistics and supply chain management: Creating value-adding networks. 3rd ed. Harlow Prentice Hall.

Clifford, N., French,S., and Valentine, G. (2010). Key Methods in Geography. SAGE

Connelly, F. (2016). Stories of experience and narrative inquiry. Educational Researcher, 19(5): 2-14.

Cooper, D., and Schindler, P. (1998). Business Research Methods, 6th edition, McGraw Hill/Irvin.

Cooper, D., and Schindler, P. (2001). Business research methods. New York: McGrew-Hill Companies.

Cooper, D., and Schindler, P. (2008). Business research methods, 10th edition, McGraw Hill/Irwin.

Cooperative Governance and Traditional Affairs (COGTA). (2009). Local government turnaround strategy. The Republic of South Africa.

Corbin, J., and Strauss, A. (2014). Basics of Qualitative of Qualitative research: Techniques and procedures for developing grounded theory. SAGE Publications.

Council of Supply Chain Management Professionals, (2006). 26th Annual State of Logistics Report. [Online], Available: https://cscmp.org/member-benefits/state-of-logistics.

Creswell, J. (2014). Research Design Qualitative, Quantitative, and Mixed Methods Approaches (pp. 304). Thousand Oakes, CA: SAGE Publications

Creswell, J. (2013). Qualitative inquiry and research design: Choosing among five approaches (3rd ed.). Thousand Oaks, CA: Sage.

Creswell, J. and Plano Clark, V. (2007). Mixed methods research. USA: Sage Publications, Inc

Degraeve, Z., Roodhooft, F., and Van Doveren, B. (2005). The use of total cost of ownership for strategic procurement: A company-wide management information system. Journal of the Operational Research Society: 51-59.

Denzin, N.K., & Lincoln, Y.S. (2005). Introduction: The discipline and practice of qualitative research. In N.K. Denzin& Y.S. Lincoln (Eds.), The sage handbook of qualitative research (2nd ed.). Thousand Oaks, CA: Sage.

De Vos, A., Strydom, H., Fouché, C., and Delport, C.S.L. (2011). Research at Grass Roots: For the Social Sciences and Human Service Professions: 4th ed., Pretoria: Van Schaik Publishers.

Dlamini, W. (2016). Determining procurement best practices in South African Comprehensive Universities.

Dlomu, P. (2017). The impact of irregular expenditure in the South African Public Finance with specific reference to the National Department of Public Works. Cape Peninsula University of Technology.

Dundar, H. (2014). Building the skills for economic growth and competitiveness in Sri Lanka: World Bank Publications

Edmonds, W., and Kennedy, T. (2013). An applied reference guide to research designs: Qauntitative and mixed methods: Politics and Social sciences

Erven, B. (2007). The Role of Human Resource Management in Risk Management. Ohio State University.

Essig, M,.andDorobek, S. (2006). 'Adapting the Balanced Scorecard to Public Supply Chain Management'. Working Paper for the 15th Annual IPSERA Conference, San Diego, CA

Explore more: Water Quality. (2004). Lowa Public Television, NPP.

Fawcett, S., Magnan, G., and McCarter, M. (2008). Benefits, barriers and bridges to effective supply chain management. Supply chain management: An international journal. 13(1): 5-48.

Fiorino, D. (1989). Environmental risk and democratic process: a critical review. Columbia Journal of Environmental Law: 501-547.

Fox, W., and Bayat, M.(2007). A guide to managing research. Cape Town: Juta.

Free Basic Water. (2002). Implementation Strategy Document: Version. Government

Gabriel, D. (2013). Inductive and Deductive approaches to research. Available online :http://deborahgabriel.com/2013/03/17/inductive-and-deductive-approaches-to-research/

Ghiyasvandian, S. (2014). Nurses policy influence: A concept analysis. Iranian Journal of nursing and midwifery research.

Giupponi, C., Jakeman, A., Karssenberg, D., and Hare, M. (2006). Sustainable management of water resources: An integrated approach, Edward Elgar Publishing limited, Massachusetts.

Grandjean , P. (2004). Implications of the precautionary principle in research and policy-making. Am J Ind Med. 45:382-5.

Graythorne, D. (2006). Municipal administration: the handbook. Kenwyn: juta. :119.

Grbich, C. (2013). Qualitative Data Analysis: An Introduction. 2nd ed., London: SAGE Publications.

Hallikas, J., Karvina, I., Pulkkinen, U., Virolainen, V., and Tuominen, M. (2004). Risk Management process in supplier networks. International Journal of Production Economics: 47-58.

Hanfield, R., Monczaksa, R., Giunipero, L., and Patterson, J. (2009). Sourcing and supply chain management. 4th ed. Australia; South Western/ Cengage Learning.

Harland, C., Brenchley, R., and Walker, H. (2003). Risk in supply networks. Journal of Purchasing and Supply Management . http://dx.doi.org/10.1016/S1478-4092(03)00004-9 : 51-62

Haron, N. (2012). The application of quality function deployment (QFA) in the design phase industrialized building system (IBS) apartment construction project. European International Journal of Science and Technology, Vol 1 No. 3

Hawkin, T., Gravier, M., and Powley, E. (2011). Public versus private sector procurement ethics and strategy: What each sector can learn from the other. Journal of Business Ethics: 567-586.

Heckmann, I., Comes, T., and Nickel, S. (2015). A critical review on supply chain risk. Definition, measure and modeling. Omega (52): 119-132.

Heller, J. (2013). Supply chain management perpectives in the Public and Private Sectors. Advance in business research. Tarleton State University: 107-113.

Hillman, K. (2014). Top examples of evolutionary Psychology- The psychology primitive man

Holbeche,L.(2006). Understanding Change: Theory, Implementation and Success. Oxford

Hofman, H., Busse, C., and Bode, C. (2014). Sustainability- related supply chain risks: Conceptualisation and management. Business Strategy Environment: 160-172.

Holloway, A. (2003). Disaster reduction in Southern Africa', African Security Review, 12(1): 29-38.

Hollway, F. (2005). The forgotten need for rehabilitation in contemporary mental health services: A position statement from the executive committee of the faculty of rehabilitation and social psychiatry.

Jordaan, J. (2013). Public Financial Performance Management in South Africa: A conceptual approach. Unpublished Dissertation Sumitted in partial fulfillment for the degree of Doctor of Philosophy in Public Affairs. University of Pretoria

Jurcevic, M. (2009). The role of human factors in supply chains. Proceeding of the 12th International Conference . Transport Science

Jüttner, U. (2005). Supply chain risk management: Understanding the business requirements from a practitioner perspective .The International Journal of Logistics Management, 16(1): 120 – 141.

Jüttner, U., Peck, H., and Christopher, M. (2003). Supply chain risk management: outlining an agenda for future research. International Journal of Logistics Research and Applications, 6(4): 197–210.

Kilubi, I. (2015). Supply chain risk management enablers- A framework development through systematic review of the literature from 2000 to 2015. International Journal of Business Science and Applied Management Vol 10.

Kirby, C. (2001). Experimental design: Procedures for behavioral sciences. Belmont, CA: Brooks/ Cole.

Koonin, M. (2014). Research Matters, Vallidity and Reliability, Juta Company, Cape Town, South Africa: 252-261.

Krefting, L. (1991). “Rigor in Qualitative Research: The Assessment of Trustworthiness,” American Journal of Occupational Therapy, 45(3): 214–222.

Kurtz, D., and Clow, K. (1998). Services marketing. New york: Wiley: 105.

Kvale, S., and S. Brinkman. (2008). InterViews: Learning the Craft of Qualitative Research Interviewing, 2nd edn. Sage

Lambrecht, R., and Houdt, B. (2007). An integrated Production and inventory model to dampen upstream demand variability in the supply chain. European Journal of Operations Research: 121-142.

Larson, P. (2009). Public versus private sector perspectives on supply chain management. Journal of Public Procurement, 9(2): 222-247.

Lavastre, O., Gunasekaran, A., and Spalanzani, A. (2012). Supply chain risk management in French companies. Decision Support Systems, 52(4): 828-838.

Lee, S., Gon, B. and Kim, H. (2012). An integrated view of knowledge management for performance. Journal of Knowledge Management, 16(2): 183-203.

Leduka, M. (2009). Partcipatory Budgeting in the South African Local Government Context: The case of the Mantsopa Local Municipality. Free State province

Leedy, P., and Ormrod, J. (2005). Practical research: Planning and design. 8th ed. New Jersey: Parson Education.

Lewin, K. (1951). Field Theory in Social Science . Harper and Row, New York.

Ligami, C. (2017). World Bank Forum calls for private sector to build skills

Lindlof, T., and Taylor , B. (2010). Qualitative communication research methods. 3rd ed. Thousand Oaks, CA: Sage Publications

Ling, L and Ling, P. (2016). Methods and Paradigms in Education Research. Advances in Educational Marketing, Administration, and Leadership. Hershey: IGI Global.

Litov, K., and Yeung B. (2005). Corporate Governance and Managerial Risk Taking: Theory and Evidence, Working Paper.

Machethe, E. (2011). The causes and impact of water shortage on the households of Ga-kgapane Township in the Limpopo Province.

Madisha, K. (2017). Torrent of water cuts. The New Age. Available [Online]: http://www.thenewage.co.za/torrent-of-water-cuts/

Mafuwane, B. (2012). The contribution of institutional leadership to learner performance. University of Pretoria.

Maiketso, K. (2015). The level of compliance with Public Finance . NWU: pp. 21.

Makgatho, K. (2013). Effectivess of internal control mechanisms in monitoring financial resources at the Gauteng Department of Education. North-West University, Vaal Triangle Campus.

Manuj, I., and Mentzer, J. (2008). Global supply chain risk management. Journal of Business Logistics, 29(1): 133–155.

Maree, K. (2007). First Steps in Research. Pretoria: Van Schaik.

Marokan, M. (2012). The impact of implementation of supply chain management policy in the department of local government and housing in Limpopo province.

Mbhele, T.P. (2014). Antecedents of Quality Information Sharing in the FMCG Industry. Journal of Economics and Behavioral Studies 6 (12), 986-1003. ISSN: 2220-6140.

Mbili, T. (2015). The demand for agile/ leagile third party logistics services: An assessment of Diary Industry need. University of KwaZulu Natal.

McCue, C., and Prier, E. (2008). Using agency theory to model cooperative public purchasing. Journal of Public Procurement, 8(1): pp. 1-35.

Meixell, M., and Gargeya, V. (2005). Global supply chain: A literature review and critique. Transportation Research Part E, vol. 41, no. 6: 531-550.

Mentzer, J. (2004). Fundamental of supply chain management, Thousand Oaks, California: SAGE Publications.

Mhlongo, N. (2014). Transparency in supply chain management: A South African Local Government Case Analysis: 11.

Mindtools. (2014). Force Field Analysis: Analysing the pressure for and against change.

Mkhize, Z. (2004). Transforming the government procurement system. Paper presented at the Supply Management Conference. Durban, South Africa.

Moeti, K., Khalo, T., Mafunisa, J., Nsingo, S. and Makondo, T. (2007). Public finance fundamentals. Cape Town: Juta.

Moosa, V. (1996). Local government: structures: the challenges. Paper presented at South Africa

Musa, S. (2012). Supply chain risk management: Identification, evaluation and mitigation techniques. Department of Management and Engineering.

Mwanza, F. (2013). The effect of corporate governance of financial management in consistency development funds in Kenya

Myeni, G. (2017). Zululand District to meet department on water debt. Zululand Observer.

Myers, M. (2009) Qualitative research in information systems: General References on Qualitative Research. 33, (4): 647-662.

Naidoo, G. (2009). Corporate governance: an essential guide for the South African companies. 2nd ed. Pretoria: juta: 104.

Narasim, R., and Talluri, S. (2009). Perspectives on risk management in supply chains. Journal of Operations Management, 27(2): 114-118.

Nasrabadi, A., Mohammadpour, A., Abbasi, M., and Javadi, N. (2012). Understanding thematic analysis and its pitfall.

Nealer, E. (2009). TD: The Jounal for Transdisciplinary Research in Southern Africa", Vol(1): 73-85.

Nealer, E., and Raga, K. (2007). Nature and extetd of local governance in South Africa. Journal of public administration: conference proceedings, 42(5): 171-182. [sabinet online, sa publications, full display: http://www.sabinet.co.za]

Nell, E. (2016). Investigating the effect of the incorporation of the Free State College. University of Free State.

Nelson, M. (1997). Municipal government approaches to service delivery: An analysis from a transactions cost perspective. Economic Inquiry: 82-96.

Ngwenya, K., and Naude, M. (2016). Supply chain management best practices: A case of humanitarian aid in Southern Africa', Journal of Transport and Supply Chain Management 10(1): 242. http://dx.doi.org/10.4102/ jtscm.v10i1.242

Nkwana, H. (2014). Managerial Leadership development in the public sector. University of Pretoria

Olivia, S. (2017). Statistics Solutions. Advancement through clarity. What is confirmbility in qualitative research and how do we established it?

Olson, D., and Wu, D. (2010). Manage your Supply Chain Risk.

Oubouch, L. (2015). Overview on supply chain resilience. Materials Management review, 11(9).

Pablos, P. (2016). Management strategies and solution for business success Asia: 128. University of Oriedo, Spain. [Business economics]

Pauw, J., Woods, G., Van der Linde, G., Fourie, D., and Visser, C. (2009). Managing public money systems from the South. 2nd edition. Johannesburg: Heinemann

Peter, S., Hillson, D., and Ken, N. (1997). Project risk analysis and management guide. High Wycombe, UK: The association for Project Management.

Pettit, T., Croxton, K., and Fiksel, J. (2013). Ensuring supply chain resilience development and implementation of an assessment tool. Journal of Business Logistics 34(1): 46-76.

Pretorius, D., and Schurink, W. (2007). Enhancing service delivery in local government: the case of a district municipality.S.A journal of human resource management, 5(3): 19-29. [insajhrm, full display: http://www.sajhrm.co.za]

Public Service Commission (PSC). (2002). Integrating Risk Management in the Public Service.

Pujawan, N., and Geraldin, L. (2009). "House of risk. A model for proactive supply chain risk management". Business Process Management Journal, 15(6): 953-967.

Radke, A., and Tseng, M. (2012). A Risk Management-based Approach for Inventory Planning of Engineering-to-order Production. CIRP Annals-Manufacturing Technology 61: 387–390.

Ragin, C. (1994). Constructing Social Research. Thousand Oaks, CA: Pine Forge Press.

Ranney, M. (2015). Interview-Based Qualitative research in emergency care part two: Data collection and results reporting :22.

Reed, T., Bowman, D., and Knipper, M. (2005). The challenge of bringing industry best practices to public procurement: Strategic sourcing and commodity councils. International Public Procurement Conference. http://www.ippa.ws/IPPC1/BOOK/ Chapter_14.pdf.

Remenyi, D., Willias, B., Money, A., and Swartz, E. (2005). Doing research in Business and Management, an introduction to process methods. London, Sage Publications: 309, ISBN 0 7619 5949 1 Hbk 45.00.

Ritchie, J., and Lewis, J. (2003). Qualitative research practice: a guide for social science students and researchers. London: sage publications.

Rouse, C. (2016). Delivery in the Economic Profession: A new attack on an old problem. Journal of Economics Perspectives. Vol. 30(4): 221.

Saldana, J. (2015). The coding manual for qualitative researchers.

Sampson, S., and Spring, M. (2012). Customer roles in service supply chains and opportunities for innovation. Journal of Supply Chain Management. 48 (4): 30–50.

Saunders, M., Lewis, P., and Thornhill, A. (2009). Research Methods for Business Students. 5th ed., Harlow: Pearson Education Limited.

Saunders, M., Lewis, P., and Thornhill, A. (2012). Research methods for business students (6th ended.) Harlow, England: Pearson Education.

Scholten, K., and Fynes, B. (2017). Sustainable Supply Chains: A Research based textbook on operations and strategy: 413-436.

Scully, J. (2013). The Driving Force behind Agile Human Resource Service Delivery. Human Capital Institute.

Sehoa, M. (2015). Implementation of performance management system on the performance of Municipal Section 57 manager in the Capricorn District Municipality, Limpopo.

Sekaran, U. (2003) Research Methods for business: a skill approach, 4th edition, John Wiley and sons, USA.

Sekaran, U., and Bougie, R. (2013). Research methods for business: a skill-building approach. 6th ed., Chichester: West Sussex Wiley.

Shao, J., and Müller, R. (2011). The development of constructs of program context and program success: A qualitative study. *International Journal of Project Management*, **29**(8): 947–959.

Shenkir, W. (2007). Institute of Management Accountants10 Paragon Drive Montvale, NJ 0761760

Silverman, D. (1998). Qualitative research theory, method and practice, SAGE Publications, Calirfonia

Stephen, C., Sally, O., and Yue, W. (2007). "A robust optimization model for multi-site production planning problem in an uncertain environment", European Journal of Operational Research, Vol 181(1) : 224-238.

Stock, J. (2009). A Research view of supply chain management: Developments and topics for exploration. 25(2): 147-160.

Stone, T. (2009). Water supply: Thinking strategically, IMIESA.

Sumo, R., Van Weele, A., Van der Valk, W., and Duijsters, G. (2016). Using performance-based contracts

Surbhi, S. (2015). Difference between Public Sector and Private Sector.

Szymczak, M. (2013). Managing towards supply chain maturity. Business process outsourcing and offshoring. United Kingdom: Palgrave Macmillan.

Talluri, S., Narasimhan, R., and Nair, A. (2006). Vendor Performance with Supply Risk: A Chance-constrained DEA Approach. International Journal of Production Economics 100: 212–222.

Taylor, S., and Bogdan, R. (1998). In-depth interviewing. In: S.J. Taylor & R. Bogdam, eds. Introduction to Qualitative Research Methods: A Guidebook and Resource: John Wiley and Sons

Terr Blanche, M., Durrheim, K. and Painter, D. (2012). Research in Practice: Applied Methods for Social Sciences. 2nd Edition, UCT Press, Cape Town.

The Republic of South Africa. (1998). Local government: municipal structures act (117 of 1998). Government gazette vol. 402 no.19614. Pretoria: government printers.

The World Bank. (2014). Risk and opportunity. World Development Report.

Thomas, J. (1985). Force Field Analysis: A New Way to Evaluate Your Strategy. Long Range Planning, Vol. 18(6): 54-59.

Thomas, P. (2010). Towards developing a web-based blended learning environment at the University of Botswana, University of South Africa, Pretoria,

Thorpe, R. (2013). The Process of Conducting Qualitative Research as an Adjunct to the Development of Therapeutic Abilities in Counseling Psychology. New Zealand Journal of Psychology 42(3): 35-43.

Vaismoradi, M., Turunen, H., and Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. Nursing & Health Sciences 15(3): 398-405.

Van der Waldt, G. (2007). Municipal management: Serving the people. Cape Town: Juta.

Van Vuuren, L. (2009). The State off Water in South Africa – Are we heading for a Crisis? The Water Wheel, Sept/Oct: 31-33.

Van Weele, A. (2010). Purchasing process. Purchasing and supply chain management. Hampshire. United Kingdom: 106.

Van Wyk, B. (2012). Research design and methods Part I. [online], available: https://www.uwc.ac.za/Students/Postgraduate/Documents/Research_and_Design_I.pdf. [17 July 2017].

Vilko, J., Ritala, P., and Edelmann, J. (2014). "On uncertainty in supply chain risk management", The International Journal of Logistics Management, Vol.25(1): pp. 3-19.

Vilko, J., Rumpu, A. and Koivuniemi, J. (2012) 'An information-exchange perspective on supply-chain risk management: systemic organisational motives and cognitive barriers', *Int. J. of Logistics Systems and Management*, Vol. 12(4): 460-482.

Vosloo, J. (2014). A sport management programme for educator training in accordance with the diverse needs of South African Schools

Wachauf-Tautermann, S., and Weichert, S. (2015). Impact of External Situational factors on the Agility of Humanitarian Supply Chains- A Case Study of Haiti Earthquake 2010. International Logistics and Supply Chain Management. [online], available: http://www.diva-portal.se/smash/get/diva2:811355/FULLTEXT03.pdf. [30 June 2017].

Walton, N. (2010). What is Research Ethics? Available online: https://researchethics.ca/what-is-research-ethics/

Welman, C., Kruger, F., and Mitchell, B. (2005). Research Methodology. 3rd edition. Oxford, Oxford University Press.

Wenhold, F., and Faber, M. (2009). Water in Nutritional Health of individuals and households: An overview. Water SA Vol. 35 1 January 2009.

White paper on service delivery, (1997). Government printer: Pretoria

White Paper on Water Supply and Sanitation Policy. (1994). Government printer: Pretoria

Wieland, A., and Wallenburg, C. (2012). Dealing with supply chain risks: Linking risk management practices and strategies to performance. International Journal of Physical Distribution and Logistics Management, 42(10): 887-905.

Wilson, N. (1993). Supply chain management: a case study of a dedicated supply chain for bananas in the UK grocery market. University Press, 1(2): 28-35.

Wyse, S. (2011). What is the Difference between Qualitative Research and Quantitative Research? [online], available: http://www.snapsurveys.com/blog/what-is-the-difference-between-qualitative-research-and-quantitative-research/.

Zsidisin, G., and Wagner, S. (2010). Do perceptions become reality? The moderating role of supply risk resiliency on disruption occurrence. Journal of Business Logistics, 31(2): 1-20.

Zsisdin, G., Ellram, L., Carter, J., and Cavinato, J. (2004). An analysis of supply risk assessment techniques. International Journal of Physical Distribution & Logistics Management, 34(5): 397-413.

List of Appendices

Appendix A: Interview Guide

School of Management, IT and Governance

Voluntary Interview

Researcher: Sebenzile Ayanda Khuzwayo **Tel:** 0616586407

Supervisor: Dr Thokozani Patmond Mbhele 0312607524

Research Office: Mariette Snyman 0312608350

Title: Dimensions of Supply Risks in the Supply of water: the case of Zululand District Municipality

Appendix B: Interview Guide

(Proposed Interview time: 60 minutes)

Date:

Organization:

Person Interviewed:

<u>Interview Guide</u>

1. **Introduction**

The introduction phase of this interview session will seek to ensure that the purpose of the study is clearly defined to participants and ensuring that the objectives of the study are met. The aim of

this section is to also assure the participants of confidentiality in the information that they will make available, also the interviewer will request permission to record the individual responses of the participants.

2. General

The aim of this section is to ensure that the participants are familiar with the concepts that will be mentioned in this study. Furthermore, it will give a clear understanding of the activities carried out by the municipalities departments with regards to water supply.

2.1. Individual Profile

The aim of this section is to understand the individual profile of the officials in the municipality in order to determine their tasks and roles the play in the organization.

- What is your role in the Zululand District Municipality, especially with regards to service delivery?
- What do you think is the state of water demand in the surrounding areas of the ZDM?
- What are some of the problems that you face in your strive towards the provision of water service in ZDM?
- What remedial measures have you set to counter the above problems?

2.2.Organisational Profile

The questions in this section will include:

- Who are the main players and partners involved in the provision of water and what are their responsibilities with regards to service delivery?
- What is the current state of the ZDM Supply Chain Management?
- What is the gap between the proposed implementation of Supply Chain Management activities and the actual situation at the municipality with regards to service delivery?

3. Water Supply and Supply Chain Management

The questions in this section will include:

- What do you think is the state of water supply within the Zululand District Municipality (ZDM) region?
- What are the causes of inadequate water supply in the ZDM with regards to the system?
- How does water insufficiency affect the livelihood of the Zululand region?
- What are the available water services in the region of Zululand?
- How do you/department contribute to the water sector in ZDM?
- What are the risk response strategies implemented by the municipality?
- How long does it take the municipality to respond to water demand issues?
- What are the steps that the organization has taken in ensuring that it adopts SCM practices that facilitate efficient responsiveness to the water needs of the community
- Does the municipality consist of SCM activities that are considered as being part of the organizations water supply?
- How does the municipality show accountability and transparency in planning, regulating and maintaining the SCM activities with regards to water supply?
- Are there any approaches you think should be employed to ensure sustainable water services in the Zululand region?
- Suggest ways in which the water supply service in ZDM can be achieved?
- Are you satisfied with the current ideas of various stakeholders in provision of water and in what ways are you prepared to cooperate with other institutions to address water supply risks?
- Which community based projects are you willing to initiate in order to cater for water?
- Do you think community participation in planning, implementation and management of water projects is feasible?

Thank you for your participation. We greatly appreciate your involvement.

Appendix B: Ethical Clearance

17 August 2017

Ms Sebenzile Ayanda Khuzwayo (212527318)
School of Management, IT & Governance
Westville Campus

Dear Ms Khuzwayo,

Protocol reference number: HSS/1118/017M
Project title: Dimensions of Supply Risks in the supply of water: A case of Zululand District Municipality

Approval Notification – Expedited Application

In response to your application received on 19 July 2017, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....

Dr Shamila Naidoo (Deputy Chair)

/ms

Cc Supervisor: Dr TP Mbhele
Cc Academic Leader Research: Professor

Appendix C: Informed Consent

Informed Consent Letter

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF MANAGEMENT, IT & GOVERNANCE

Dear Respondent,

M-COM Thesis
Researcher: Ms SA Khuzwayo (0616586407)
Supervisor: Dr TP Mbhele (0312607524)
Research Office: Mariette Snyman (0312608350)

I, Sebenzile Ayanda Khuzwayo**,** is a MCOM student, at the School of Management, IT & Governance, of the University of KwaZulu Natal. You are invited to participate in a research project entitled "Dimensions of Supply Risks in the Supply of water: the case of Zululand District Municipality"

The main aim of this study is to investigate the supply risks faced by the Zululand District Municipality with regards to delivering water to the community. The study also aims to establish the balance between water supply and water demand.

Through your participation I hope to understand the supply risks faced by the municipality in order to have some sort of knowledge as to why the inadequacy of water is still a threat to the communities around the country.

Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence. There will be no monetary gain from participating in the interviews. Confidentiality and anonymity of records identifying you as a participant will be maintained by the SCHOOL OF MANAGEMENT, IT & GOVERNANCE, at the University of KwaZulu Natal.

If you have any questions or concerns about participating in the interviews or about participating in this study, you may contact me or my supervisor at the numbers listed above.

Sincerely

Investigator's signature_____ Date_____

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OFMANAGEMENT, IT & GOVERNANCE

M-COM Thesis
Researcher: Ms SA Khuzwayo (0616586407)
Supervisor: Dr TP Mbhele (0312607524)
Research Office: Mariette Snyman (0312608350)

CONSENT

I……(full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

SIGNATURE OF PARTICIPANT DATE

……

Appendix D: Editor's Note

EDITOR'S NOTE 1

25 April 2017

Re: LANGUAGE EDITING STATEMENT

I, THE UNDERSIGNED, hereby confirm that I have edited research proposal titled **DIMENSIONS OF SUPPLY RISKS IN THE SUPPLY OF WATER: A CASE OF ZULULAND DISTRICT MUNICIPALITY**by**SebenzileKhuzwayo,** for the degree **Master of Commerce in Supply Chain Management.**

Regards

H.Mapudzi

Dr.HatikanganwiMapudzi

PhD (Communications), M. A (Journalism & Media Studies), PGDip (Media Management), B.Soc. Scie. (Hons) (Communications), B. Applied Communications Management.

EDITOR'S NOTE 2

Dr Elijah Mkhatshwa

B Th, BA (Hons) English, MA English (University of Natal), MA Linguistics, D Phil English & D Phil Linguistics (University of Zululand)

14 December 2017

TO WHOM IT MAY CONCERN

CONFIRMATION OF EDITING: MASTERS' DISSERTATION

Name of Candidate: Ms Sebenzile Khuzwayo

Student Number: 212527318

Title of Dissertation: Dimensions of Supply Risks in the Supply of Water: A case of Zululand District Municipality

This serves to confirm that I have edited Ms Khuzwayo's dissertation whose title appears above. The editing of the document focussed solely on academic writing paying particular attention to the language structures that typify academic prose. In the process of doing so, no attempt was made to interfere with the content of the study and its presentation in the form of argumentation.

If need be, further information will be furnished upon request.

Yours faithfully,

Dr Elijah Mkhatshwa

English Studies, Howard College Campus

Tel. 031-2601536

Cell: 0721225001

E-Mail: Mkhatshwae@ukzn.ac.za